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SUSPENSION AND STEERING

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WHEELS

2 and 4-Wheel Drive

REMOVAL & INSTALLATION

See Figures 1 and 2

The vehicles covered by this manual use a variety of wheel styles, but from the factory they are all one piece rims with 5 bolt holes in a bolt circle of 4.75 in. (120.6mm) for vehicles through 1991 or 5 in. (127mm) for 1992-93 vehicles. Wheels are also available in a variety of standard sizes from 14 x 6 in. (355.6 x 152.4mm) to 15 x 7 in. (381 x 177.8mm). The MFI-Turbo was equipped with 16 x 8 in. (406.4 x 203.2mm). Most vehicles are equipped with a space saver spare, for EMERGENCY USE ONLY, which comes in a 16 x 4 in. (406.4mm x 101.6mm) and 15 x 4 in. (381 x 101.6mm) sizes.

1. When removing a wheel, loosen all the lug nuts with the wheel on the ground, then raise and safely support the vehicle. If you are working at home (not on a roadside emergency) support the truck safely using jackstand(s).
2. If the wheel is stuck or rusted on the hub, make all the lug nuts finger tight, then back each one off 2 turns. Put the truck back on the ground and rock it side to side. Get another person to help if necessary. This is far safer than hitting a stuck wheel with the vehicle on a jack or jackstands.
3. When installing a wheel, tighten the lug nuts in a rotation, skipping every other one.
4. Always use a torque wrench to avoid uneven tightening, which will distort the brake drum or disc. For vehicles through 1991 (except MFI-Turbo) tighten the lug nuts on steel wheels to 73 ft. lbs. (100 Nm) and the nuts on aluminum alloy wheels to 90 ft. lbs. (120 Nm). For 1992 stock wheels, tighten the nuts to 90 ft. lbs. (120 Nm). For 1991-92 MFI-Turbo wheels, tighten the lug nuts to 100 ft. lbs. (140 Nm). On 1993 vehicles equipped with the stock wheels, tighten the lug nuts to 95 ft. lbs. (130 Nm).

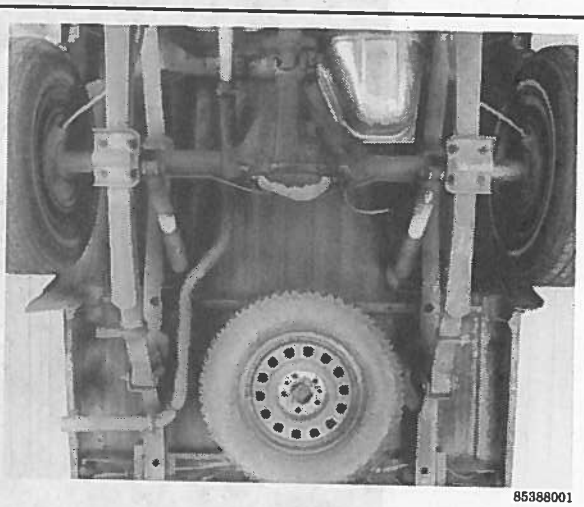

Fig. 1 Most trucks are equipped with a spare tire mounted to a hanger bracket under the bed

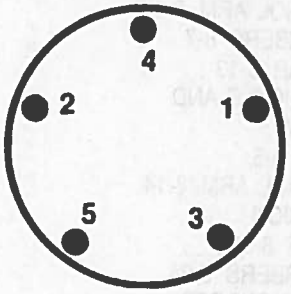

Fig. 2 Wheel lug tightening sequence for a 5-lug wheel

INSPECTION

See Figures 3 and 4

Wheels can be distorted or bent and not effect dry road handling to a noticeable degree. Out of round wheels will show up as uneven tire wear, or will make it difficult to balance the tire. Wheel runout can be checked with the wheel on or off the truck and with the tire on or off the rim. If measurement is to be made with the wheel off the truck, you will need an accurate mounting surface such as a wheel balancer.

Both lateral and radial runout should be measured using a dial gauge. Lateral runout is a sideways vibration causing a twist or wobble and is measured on a side surface. On a tire and wheel assembly, measure the sidewall of the tire, as close as possible to the tread shoulder design edge. On a rim, measure the runout on the flange.

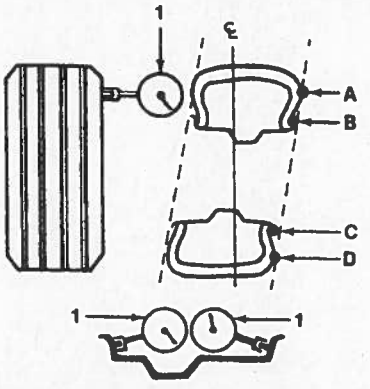

Fig. 3 Measuring lateral runout

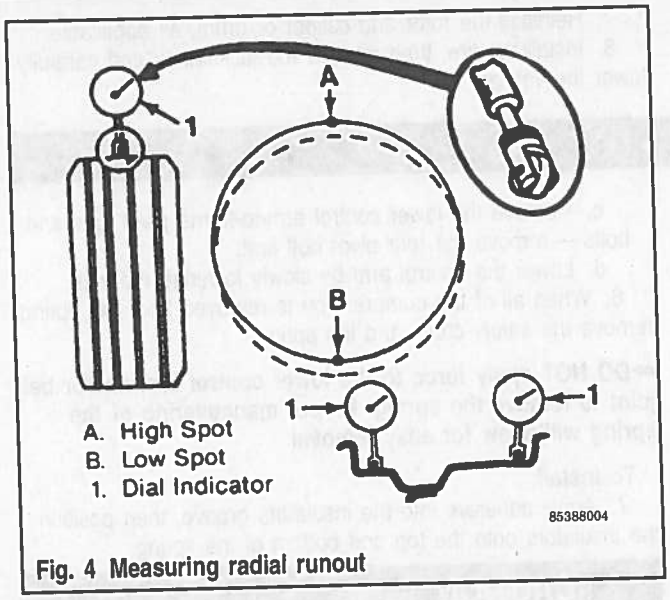

Fig. 4 Measuring radial runout

Radial runout is the egg-shaped difference from a perfect circle. On a tire and wheel assembly, measure radial runout from the center of the tire tread rib, although other tread ribs can be measured, if necessary. The rim may be measured on either flange if the tire is removed.

1. Use a dial gauge to measure the runout of the wheel or tire and wheel assembly, as applicable.
2. For steel wheels, the lateral runout limit is 0.045 in. (1.143mm), the radial runout limit is 0.040 in. (1.015mm).
3. For aluminum alloy wheels, the limit for both runout directions is 0.030 in. (0.762mm).

Wheel Lug Studs

REMOVAL & INSTALLATION

Front Wheels on 2wd Vehicles

See Figure 5

1. Raise and support the front of the vehicle safely using jackstands, then remove the wheel.
2. Remove the brake pads and caliper. Support the caliper aside using wire or a coat hanger. For details, please refer to Section 9 of this manual.
3. Remove the outer wheel bearing and lift the rotor off the axle. For details on removal, installation and adjustment, please refer to Section 1 of this manual.
4. Properly support the rotor using press bars, then drive the stud out using an arbor press.

To install:

5. Clean the stud hole with a wire brush and start the new stud with a hammer and drift pin. Do not use any lubricant or thread sealer.
6. Finish installing the stud with the press.
7. Install the rotor and adjust the wheel bearing.
8. Install the brake caliper and pads.
9. Install the tire, then remove the jackstands and carefully lower the vehicle.

Rear Wheels and Front Wheels on 4wd Vehicles

See Figure 6

1. Raise and support the vehicle safely using jackstands, then remove the wheel.
2. On front wheels, remove the brake, caliper and rotor. Support the caliper from the suspension using wire or a coat hanger. For details, please refer to Section 9 of this manual.
3. On rear wheels, remove the brake drum.

➡When replacing the front hub bolts on vehicles with 4 wheel anti-lock brakes, remove and replace only one wheel lug stud at a time to avoid misaligning the speed sensor exciter ring.

4. Do not hammer the wheel stud to remove it. This will ruin the wheel bearing. Use the stud press tool such as J-6627A or equivalent to press the stud out of the hub.

To install:

5. Clean the hole with a wire brush and start the new stud into the hole. Do not use any lubricant or thread sealer.

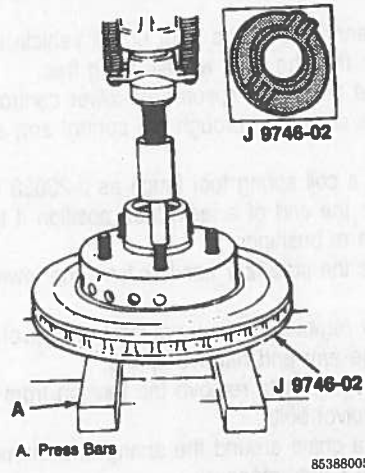

Fig. 5 Use an arbor press to drive the old stud from the rotor — front wheel of 2wd vehicles

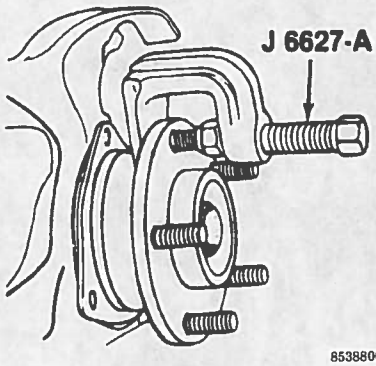

Fig. 6 On many vehicles a stud press tool may be used with the hub still installed on the vehicle

6. Stack 4 or 5 washers onto the stud and then put the nut on. Tighten the nut to draw the stud into place.It should be easy to feel when the stud is seated.
7. Reinstall the rotor and caliper or drum, as applicable.
8. Install the tire, then remove the jackstands and carefully lower the vehicle.

FRONT SUSPENSION

See Figure 7

Coil Spring

The 2wd vehicles covered by this manual use a coil spring support for the front suspension.

REMOVAL & INSTALLATION

See Figures 8 and 9

The following procedure requires the use of a coil spring removal and installation tool such as No. J-23028 or equivalent.

1. Raise and support the front of the vehicle safely using jackstands so that the front wheels hang free.
2. Remove the shock absorber-to-lower control arm bolts, then push the shock up through the control arm and into the spring.
3. Secure a coil spring tool (such as J-23028 or equivalent), to the end of a jack, then position it to cradle the inner control arm bushings.
4. Remove the stabilizer bar link from the lower control arm.
5. Properly remove the lower control arm pivot bolts in order to pivot the arm and remove spring:
   a. Raise the jack to remove the tension from the lower control arm pivot bolts.
   b. Install a chain around the spring and through the control arm as a safety measure.
   c. Remove the lower control arm-to-frame pivot nuts and bolts — remove the rear pivot bolt first.
   d. Lower the control arm by slowly lowering the jack.
6. When all of the compression is removed from the spring, remove the safety chain and the spring.

DO NOT apply force to the lower control arm and/or ball joint to remove the spring. Proper maneuvering of the spring will allow for easy removal.

To install:

7. Apply adhesive into the insulators groove, then position the insulators onto the top and bottom of the spring.

CAUTION

Use extreme care when installing and compressing the spring. Be sure the spring tool and jack and properly installed and the spring is securely seated.

8. Secure the coil spring tool, then position the coil spring and insulators on the lower control arm. Raise the control arm and spring assembly into position.
9. Install the pivot bolts, starting with the front bolt first, and secure using new nuts. Both bolts should be installed in the direction they were facing when removed, which usually means they are inserted from the front of the vehicle.
10. Install and secure the stabilizer bar link to the lower control arm.
11. Position and secure the shock absorber.
12. Remove the jackstands and carefully lower the vehicle.

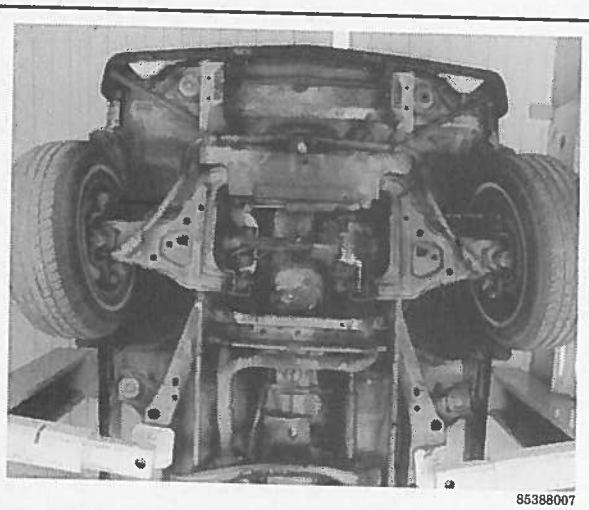

Fig. 7 View of the 4wd front suspension — visible are the lower control arms and sway bar

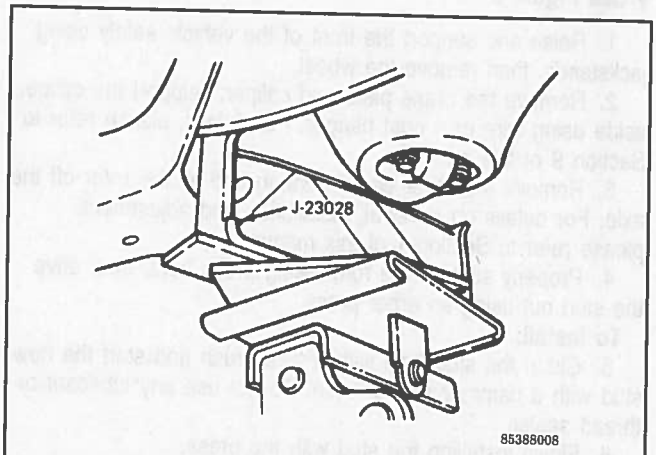

Fig. 8 With the spring tool secured to a jack, raise the control arm in order to relieve tension from the control arm pivot bolts

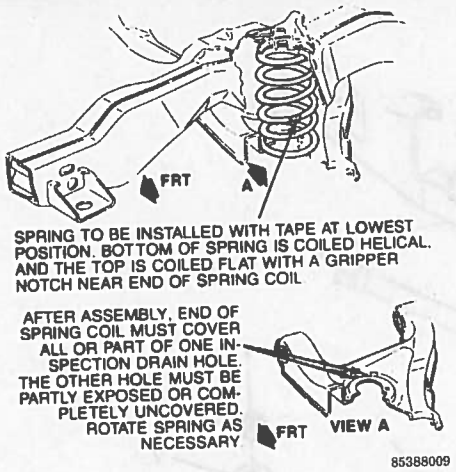
FRT
A
SPRING TO BE INSTALLED WITH TAPE AT LOWEST POSITION. BOTTOM OF SPRING IS COILED HELICAL, AND THE TOP IS COILED FLAT WITH A GRIPPER NOTCH NEAR END OF SPRING COIL
AFTER ASSEMBLY, END OF SPRING COIL MUST COVER ALL OR PART OF ONE INSPECTION DRAIN HOLE. THE OTHER HOLE MUST BE PARTLY EXPOSED OR COMPLETELY UNCOVERED. ROTATE SPRING AS NECESSARY
FRT
VIEW A
85388009

Fig. 9 The spring must be properly positioned during installation

Torsion Bar

Instead of the coil spring used on the front suspension of 2wd trucks, the 4wd vehicles covered by this manual are equipped with a torsion bar.

REMOVAL & INSTALLATION

See Figures 10, 11 and 12

➡The following procedure requires the use of the torsion bar unloader tool No. J-22517-C (early model vehicles), J-36202 (late model vehicles), or equivalent.

1. Raise and support the front of the vehicle safely using jackstands.
2. Install a torsion bar unloader tool to relax the tension on the torsion bar adjusting arm screw; record the number of turns necessary to properly install the tool. Remove the adjusting screw.

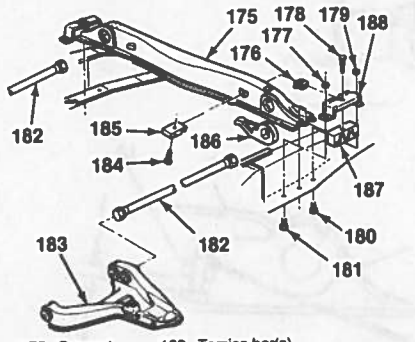

Fig. 10 Torsion bar front mounting — 4wd front suspension

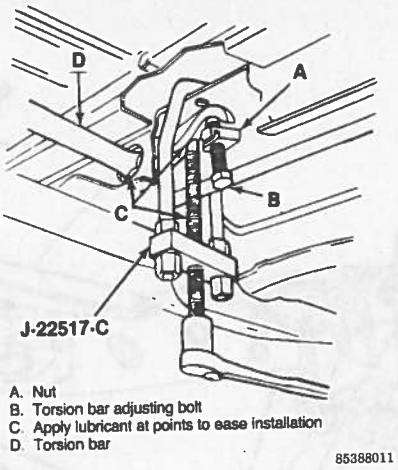

Fig. 11 Use the torsion bar unloader to ease tension so the adjuster bolt may be removed

3. For vehicles through 1991:
   a. Remove the torsion support-to-insulator nut/bolt, the support insulator-to-frame nuts/bolts, the insulator retainer and the insulator from the support.
   b. Slide the torsion bar(s) forward into the control arm(s) to clear the support.
   c. Remove the adjusting arm, the adjusting arm screw and the nut from the support.
   d. Remove the torsion bar from the control arm and the support.
4. For 1992-93 vehicles:
   a. Remove the adjuster arms.
   b. Remove the nut and square washer (raise the support out of the way) from the retainer, then remove the retainer bolts from underneath the frame.
   c. Slide the insulator off the support and remove it from the vehicle.
   d. Disconnect the muffler flange from the converter, loosen the rear exhaust hanger and lower the rear exhaust.
   e. Remove the torsion support from the frame.
   f. Remove the torsion bars from the lower control arms.

To install:

5. For 1992-93 vehicles:
   a. Position the torsion bars with the lower control arms. If installing a replacement component, be sure the tag is facing forward.
   b. Install the support.
   c. Install and secure the rear exhaust system to the proper height, then connect the muffler flange to the converter.
   d. Install the insulator, making sure the mount studs are positioned through the support and the insulator locator tabs are indexed to the support (facing forward).
   e. Install and finger-tighten the square washer and nut.
   f. Install the insulator mounting retainers, then tighten the bolts to 26 ft. lbs. (35 Nm) and/or the nuts to 25 ft. lbs. (34 Nm).
   g. Install the adjuster arms, then connect the torsion bars to the arms. With the torsion bars installed, check for an assembled clearance from the end of the bar to the support of 0.236 in. (6.0mm).

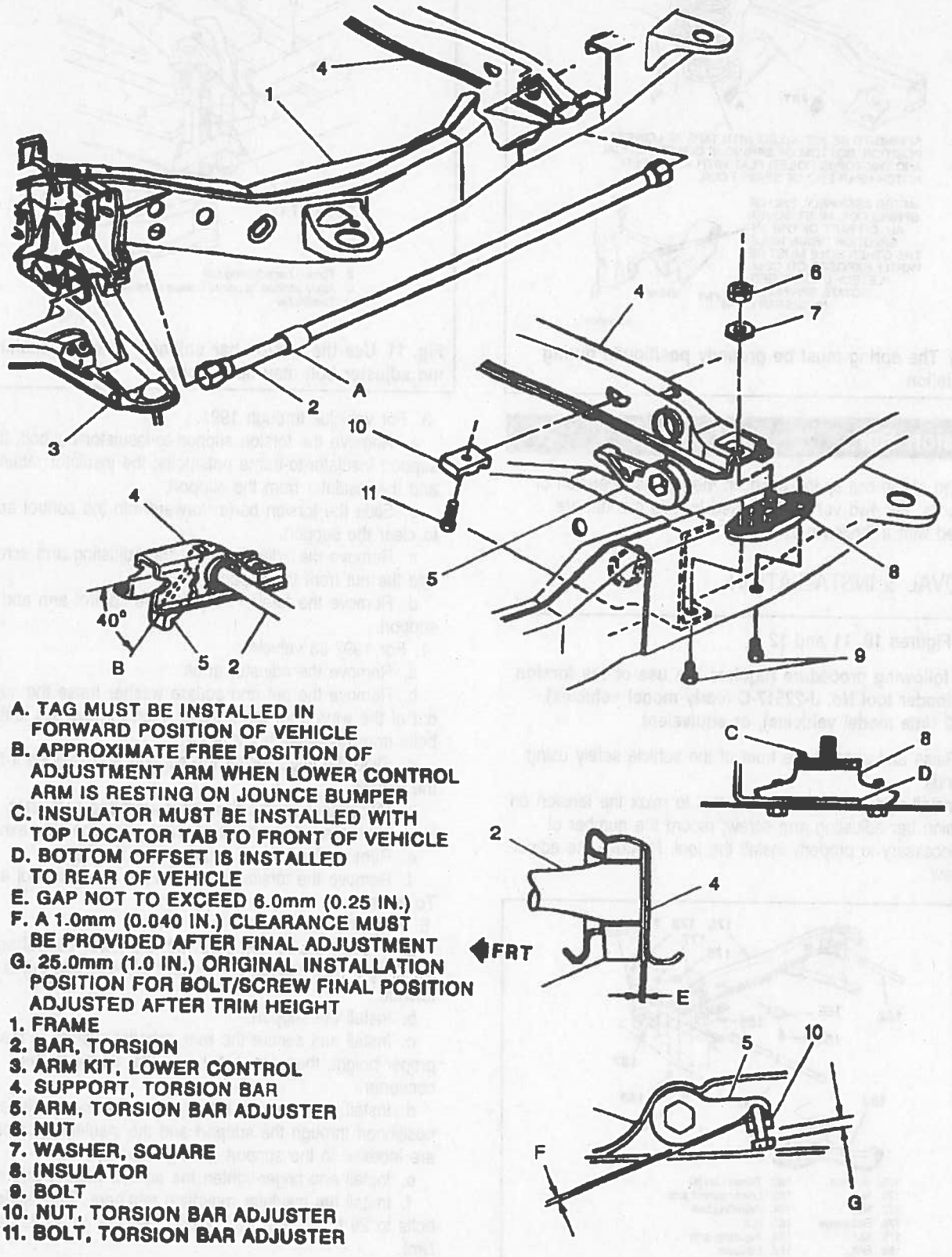
A. TAG MUST BE INSTALLED IN FORWARD POSITION OF VEHICLE
B. APPROXIMATE FREE POSITION OF ADJUSTMENT ARM WHEN LOWER CONTROL ARM IS RESTING ON JOUNCE BUMPER
C. INSULATOR MUST BE INSTALLED WITH TOP LOCATOR TAB TO FRONT OF VEHICLE
D. BOTTOM OFFSET IS INSTALLED TO REAR OF VEHICLE
E. GAP NOT TO EXCEED 6.0mm (0.25 IN.)
F. A 1.0mm (0.040 IN.) CLEARANCE MUST BE PROVIDED AFTER FINAL ADJUSTMENT
G. 25.0mm (1.0 IN.) ORIGINAL INSTALLATION POSITION FOR BOLT/SCREW FINAL POSITION ADJUSTED AFTER TRIM HEIGHT
1. FRAME
2. BAR, TORSION
3. ARM KIT, LOWER CONTROL
4. SUPPORT, TORSION BAR
5. ARM, TORSION BAR ADJUSTER
6. NUT
7. WASHER, SQUARE
8. INSULATOR
9. BOLT
10. NUT, TORSION BAR ADJUSTER
11. BOLT, TORSION BAR ADJUSTER
FRT
40°
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Fig. 12 Torsion bar and support mounting/alignment — 1992-93 vehicles

h. Lubricate the top of the adjusting arm and the adjusting bolt, then install the nuts and adjuster bolts.

6. For vehicles through 1991:

a. Lubricate the top of the adjusting arm, then install the arm to the support.

b. Install the adjusting bolt nut to the support, then lubricate the adjusting bolt and loosely install it to the retaining nut.

c. Install the insulator to the support end, then install the support to the frame.

d. Install the nut to the retainer and the retainer to the support, then secure the bolts to the retainer from underneath the frame.

e. Install the retainer nuts to the bolts from above the retainer, then install the top center retainer bolt. Tighten the retainer nuts (or bolts from below the frame) to 26 ft. lbs. (35 Nm) and the center retainer bolt to 25 ft. lbs. (35 Nm).

f. Slide the torsion bar into the lower control arm.

g. Raise and slide the torsion bar into the adjusting arm making sure the torsion bar clearance at the support is 0.236 in. (6mm).

7. Attach the torsion bar unloader tool using the same number of turns as recorded during removal, then thread the adjusting screw in until contact is just made with the adjusting arm.

8. Remove the torsion bar unloader tool.

9. Remove the jackstands and carefully lower the vehicle.

10. Check and adjust the trim height ("Z" adjustment), as necessary. For details, please refer to the front end alignment procedures found later in this section.

Shock Absorbers

TESTING

Visually inspect the shock absorber. If there is evidence of leakage and the shock absorber is covered with oil the shock is defective and should be replaced.

If there is no sign of excessive leakage (a small amount of weeping is normal) bounce the truck at one corner by pressing down on the bumper and releasing it. When you have the truck bouncing as much as you can, release the bumper. The truck should stop bouncing after the first rebound. If the bouncing continues past the center point of the bounce more than once, the shock absorbers are worn and should be replaced.

REMOVAL & INSTALLATION

2wd Vehicles

See Figure 13

1. Raise and support the front of the truck safely using jackstands.

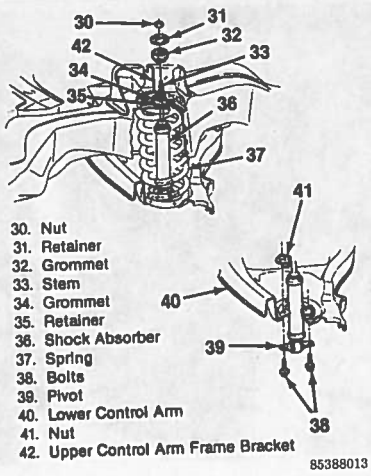


Fig. 13 Common front shock absorber mounting — 2wd vehicles

2. Using an open end wrench, hold the shock absorber upper stem from turning, then remove the upper stem retaining nut, the retainer and rubber grommet.

3. Remove the shock absorber-to-lower control arm retaining bolts and lower the shock absorber assembly from the bottom of the control arm.

4. Inspect and test the shock absorber; replace it, if necessary.

To install:

5. Fully extend the shock absorber stem, then push it up through the lower control arm and spring so that the upper stem passes through the mounting hole in the upper control arm frame bracket.

6. Install the upper shock absorber nut and tighten to 100 inch lbs. (11 Nm). Be careful not to crush the rubber bushing.

7. Install the shock absorber-to-lower control arm retaining bolts and tighten to 20 ft. lbs. (27 Nm).

8. Remove the jackstands and carefully lower the vehicle.

4wd Vehicles

See Figures 14 and 15

1. Raise and support the front of the truck safely using jackstands.

2. Remove the tire and wheel assembly to ease access.

3. Remove the shock absorber-to-lower control arm nut and bolt (using a backup wrench), then collapse the shock absorber.

4. Remove the upper shock absorber-to-frame nut and bolt (again, using a backup wrench).

5. Inspect and test the shock absorber; replace it, if necessary.

To install:

6. Position the shock absorber to the mounting brackets.

7. Install the upper and lower retaining bolts (inserted from the front of the vehicle).

8. Install the retaining nuts to the bolts, then torque the retainers to 54 ft. lbs. (73 Nm).

9. Install the tire and wheel assembly, then remove the jackstands and carefully lower the vehicle.

Fig. 14 Loosen and remove the shock absorber lower mounting bolt

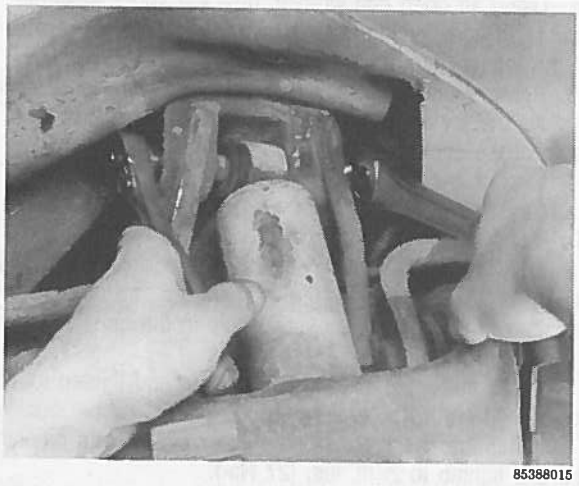


Fig. 15 Then loosen the upper mounting bolt and remove the shock from the vehicle

Ball Joints

INSPECTION

See Figures 16, 17, 18 and 19

Before performing this inspection, make sure that the wheel bearings are adjusted correctly and that the control arm bushings are in good condition.

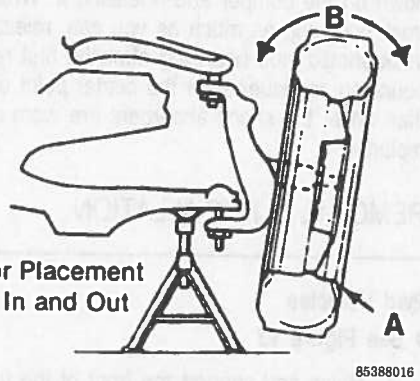
1. Make sure the vehicle is parked on a level surface.
2. Raise and support the front of the vehicle safely by placing jackstands under each lower control arm as close as possible to each lower ball joint (as far outboard as possible). Make sure that the vehicle is stable and the control arm bumpers are not contacting the frame.
3. Wipe the ball joints clean and check the seals for cuts or tears. If a seal is cut or torn, then ball joint MUST be replaced.
4. If necessary on 2wd vehicles, adjust the wheel bearings before proceeding.
5. Check the ball joints for horizontal deflection (looseness):
   a. Position a dial indicator against the lowest outboard point on the rim.
   b. Grasp the tire (top and bottom), then pull outward on the top and push inward on the bottom; record the reading on the dial indicator.
   c. Grasp the tire (top and bottom), then pull outward on the bottom and push inward on the top; record the reading on the dial indicator.
   d. The difference in the dial indicator reading is the horizontal deflection of both joints. If the reading exceeds 0.125 in. (3.2mm), the lower ball joint should be checked for wear in order to determine what component(s) must be replaced.

The lower ball joints used on 2wd vehicles use wear indicators.

6. On 4wd vehicles (no wear indicators), check the lower ball joint for wear:
   a. With the vehicle still supported by jackstands, place a dial indicator against the spindle in order to measure vertical movement.

DO NOT pry between the lower control arm and the drive axle seal or damage to the seal will result.

   b. Pry between the lower control arm and the outer bearing race while reading the dial indicator. This reading will show vertical deflection (looseness).
   c. The lower ball joint is not a pre-loaded joint and may show some looseness, but it should be replaced if movement exceeds 0.125 in. (3.2mm).
7. For 2wd vehicles check for lower ball joint wear using the indicators:
   a. Visually inspect the positioning of the grease fitting on the ball joint. The fitting is threaded into a small housing nub which projects approximately 0.050 in. (1.27mm) beyond the surface of the ball joint cover on new parts. As the joint wears, the nub will slowly retreat inward. If the housing nub is visible above the cover, then the joint is still good.



A. Dial Indicator Placement
B. Rock Wheel In and Out

Fig. 16 Check total ball joint horizontal deflection by rocking the wheel (a dial indicator is used to measure play)

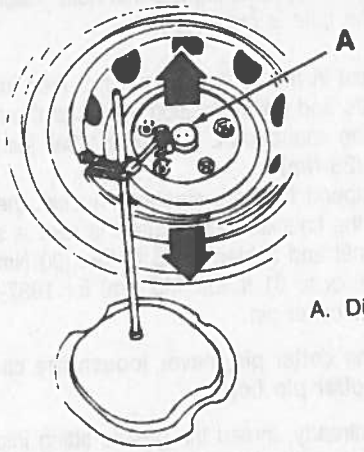


Fig. 17 A dial indicator may also be used to check lower joint vertical deflection

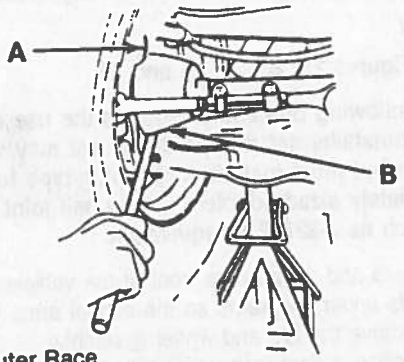


Fig. 18 Use a prybar to carefully pry between the lower control arm and outer race (NOT on the drive axle joint/seal)

b. If necessary, scrape a screwdriver or fingernail across the ball joint cover and feel for the housing nub. If the housing is flush or inside the cover surface, the joint is worn and should be replaced.

8. Finally, if the joints failed the initial combined test, but the lower joint is found good, the upper ball joint should be checked for looseness as it is probably the culprit:

a. Disconnect the upper ball joint from the steering knuckle.

b. Check for any looseness or if the stud can be twisted by hand. If so, the joint should be replaced.

REMOVAL & INSTALLATION

2wd Vehicles

UPPER

◗ See Figures 20, 21, 22, 23 and 24

➡The following procedure requires the use of a ball joint separator tool such as GM No. J-23742 or equivalent.

1. Raise and support the front of the vehicle safely by placing jackstands securely under the lower control arms. Because the vehicle's weight is used to relieve spring tension on the upper control arm, the floor stands must be positioned between the spring seats and the lower control arm ball joints for maximum leverage.

⁂CAUTION

With components unbolted, the jackstand is holding the lower control arm in place against the coil spring. Make sure the jackstand is firmly positioned and cannot move, or personal injury could result.

2. Remove the tire and wheel assembly.

3. Remove the brake caliper and support it from the vehicle using a coat hanger or wire. Make sure the brake line is not stretched or damaged and that the caliper's weight is NOT supported by the line.

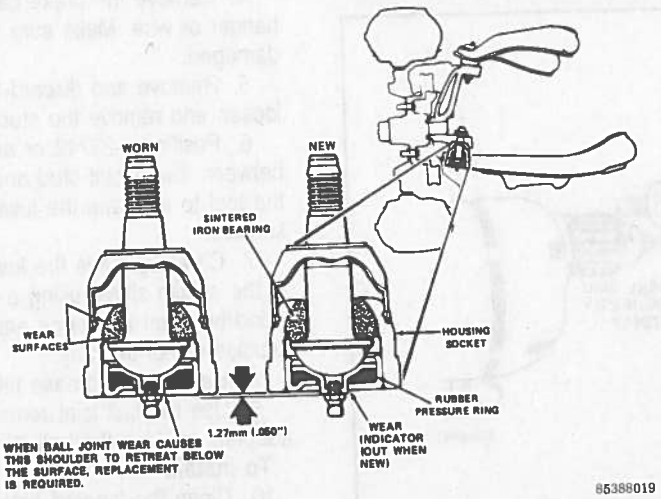


Fig. 19 The lower joints on late model 2wd vehicles are equipped with wear indicators

4. Remove the cotter pin and retaining nut from the upper ball joint.

5. Position J-23742 or an equivalent ball joint separator tool between upper joint stud and the lower joint/control arm. Use the tool to separate the upper ball joint from the steering knuckle. Pull the steering knuckle free of the ball joint after removal.

➦After separating the steering knuckle from the upper ball joint, be sure to support the steering knuckle/hub assembly to prevent damaging the brake hose.

6. Remove the riveted upper ball joint from the upper control arm:

a. Drill a ⅛ in. (3mm) hole, about ¼ in. (6mm) deep into each rivet.

b. Then use a ½ in. (13mm) drill bit, to drill off the rivet heads.

c. Using a pin punch and the hammer, drive out the rivets in order to free the upper ball joint from the upper control arm assembly, then remove the upper ball joint.

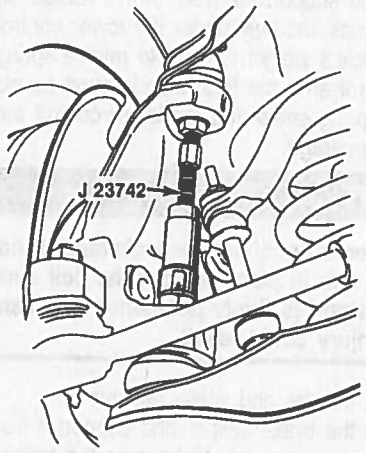


Fig. 20 Use a ball joint separator tool to drive the upper ball joint from the steering knuckle

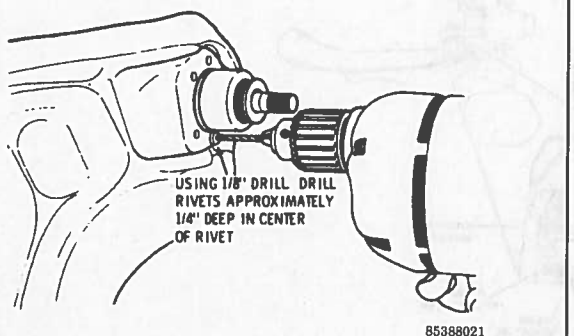


Fig. 21 Drill a small guide hole into each ball joint rivet

7. Clean and inspect the steering knuckle hole. Replace the steering knuckle if the hole is out of round.

To install:

8. Position the joint in the upper control arm, then install the joint retaining nuts and bolts. Position the bolts threaded upward from under the control arm. Tighten the ball joint retainers to 17 ft. lbs. (23 Nm).

9. Remove the support from the steering knuckle, then install the ball joint to the knuckle. Make sure the joint is seated, then install the stud nut and tighten to 65 ft. lbs. (90 Nm) for vehicles through 1986 or to 61 ft. lbs. (83 Nm) for 1987-93 vehicles. Install a new cotter pin.

➦When installing the cotter pin, never loosen the castle nut to expose the cotter pin hole.

10. If not installed already, thread the grease fitting into the ball joint. Use a grease gun to lubricate the upper ball joint.

11. Reposition and secure the brake caliper.

12. Install the tire and wheel assembly.

13. Remove the jackstands and carefully lower the vehicle.

14. Check and adjust the front end alignment, as necessary.

LOWER

◗ See Figures 25, 26, 27, 28 and 29

➦The following procedure requires the use of a ball joint remover/installer set (the particular set may vary upon application but must include a clamping-type tool with the appropriately sized adapters) and a ball joint separator tool, such as J-23742 or equivalent.

1. Raise and support the front of the vehicle safely using jackstands under the frame so the control arms hang free.

2. Remove the tire and wheel assembly.

3. Position a floor jack under the spring seat of the lower control arm, then raise the jack to support the arm.

➦The floor jack MUST remain under the lower control arm, during the removal and installation procedures, to retain the arm and spring positions. Make sure the jack is securely positioned and will not slip or release during the procedure or personal injury may result.

4. Remove the brake caliper and support it aside using a hanger or wire. Make sure the brake line is not stressed or damaged.

5. Remove and discard the lower ball joint cotter pin, then loosen and remove the stud nut.

6. Position J-23742 or an equivalent ball joint separator tool between lower joint stud and the upper joint/control arm. Use the tool to separate the lower ball joint from the steering knuckle.

7. Carefully guide the lower control arm out of the opening in the splash shield using a putty knife. Position a block of wood between the frame and upper control arm to keep the knuckle out of the way.

8. Remove the grease fitting from the control arm.

9. Use the ball joint remover set along with the appropriate adapters to drive the ball joint from the control arm.

To install:

10. Clean the tapered hole in the steering knuckle of any dirt or foreign matter, then check the hole to see if it is out of round, deformed or otherwise damaged. If a problem is found, then knuckle must be replaced.

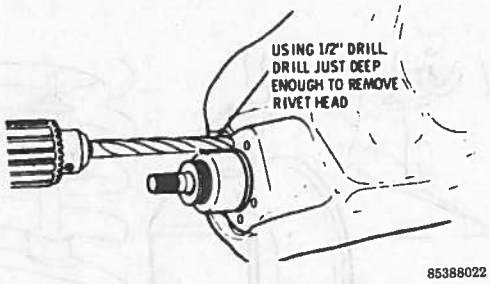


Fig. 22 Then drill off the rivet heads

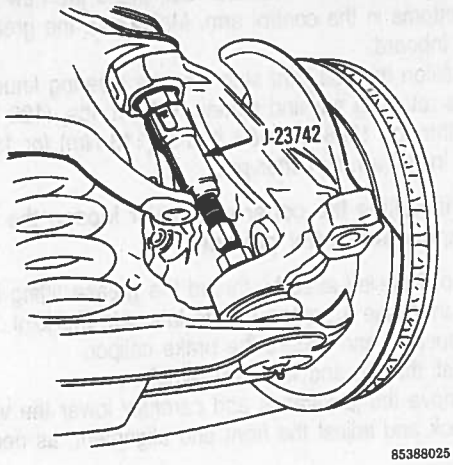


Fig. 25 Use a ball joint separator to drive the lower joint from the knuckle

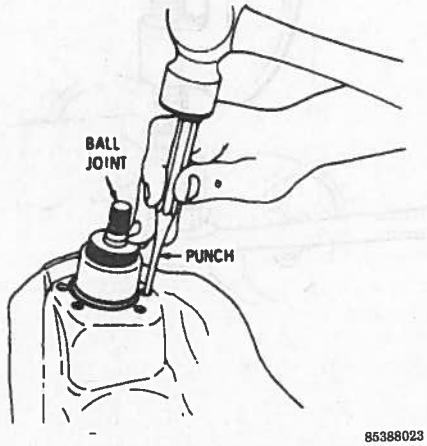


Fig. 23 Punch the rivets out and remove the ball joint

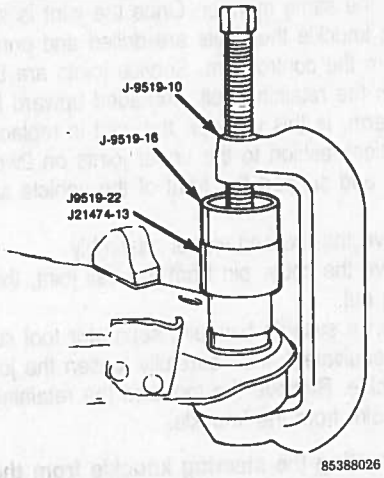


Fig. 26 Press the lower joint from the control arm — early model tool set shown

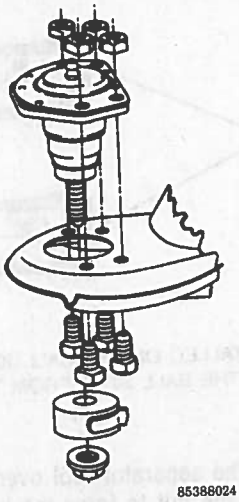


Fig. 24 Service ball joints are bolted to the control arm

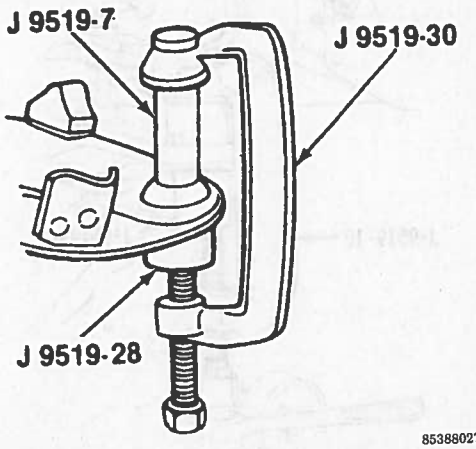


Fig. 27 Driving the lower joint from the control arm — Late model tool set

11. Using a suitable installation set, press the new ball joint until it bottoms in the control arm. Make sure the grease seal is facing inboard.
12. Position the ball joint stud into the steering knuckle, then install the retaining nut and tighten to 90 ft. lbs. (120 Nm) for vehicles through 1988 or to 83 ft. lbs. (113 Nm) for 1989-93 vehicles. Install a new cotter pin.

➡When installing the cotter pin, never loosen the castle nut to expose the cotter pin hole.

13. If not installed already, thread the grease fitting into the ball joint, then use a grease gun to lubricate the joint.
14. Reposition and secure the brake caliper.
15. Install the tire and wheel assembly.
16. Remove the jackstands and carefully lower the vehicle.
17. Check and adjust the front end alignment, as necessary.

4wd Vehicles

◗ See Figures 21, 22, 23, 24 and 30

On 4wd vehicles both the upper and lower ball joints are removed in the same manner. Once the joint is separated from the steering knuckle the rivets are drilled and punched to free the joint from the control arm. Service joints are bolted into position with the retaining bolts threaded upward from beneath the control arm. In this manner, the joint is replaced in an almost identical fashion to the upper joints on 2wd vehicles.

1. Raise and support the front of the vehicle safely using jackstands.
2. Remove the tire and wheel assembly.
3. Remove the cotter pin from the ball joint, then loosen the retaining nut.
4. Position a suitable ball joint separator tool such as J-34026, or equivalent, then carefully loosen the joint in the steering knuckle. Remove the tool and the retaining nut, then remove the joint from the knuckle.

➡After separating the steering knuckle from the upper ball joint, be sure to support the steering knuckle/hub assembly to prevent damaging the brake hose.

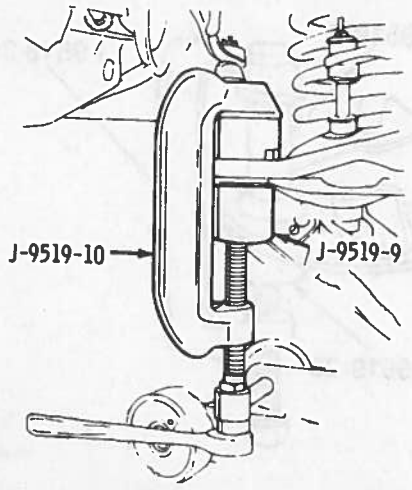


Fig. 28 Installing a new ball joint — early model

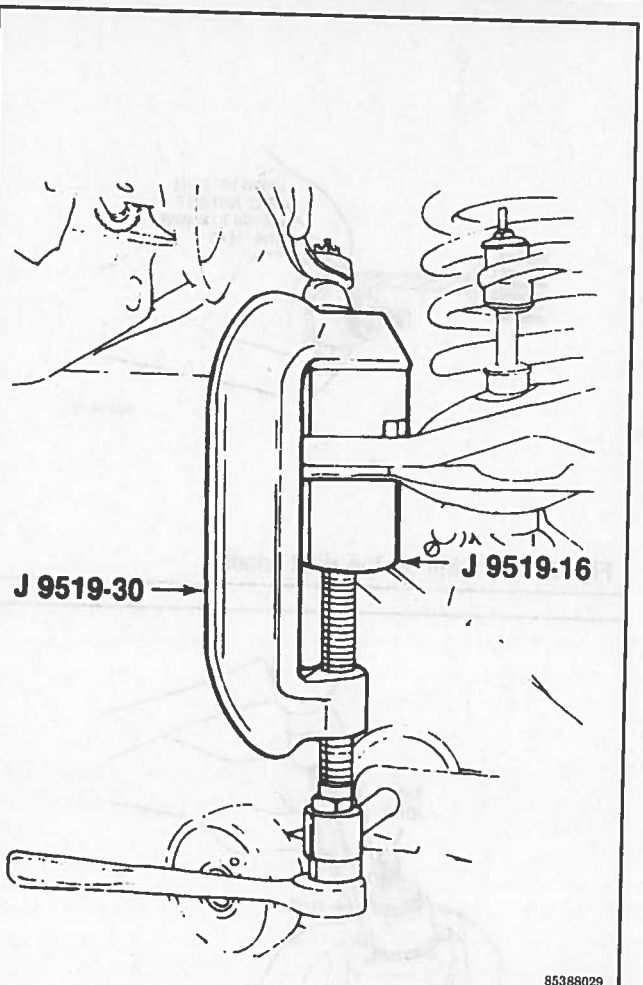
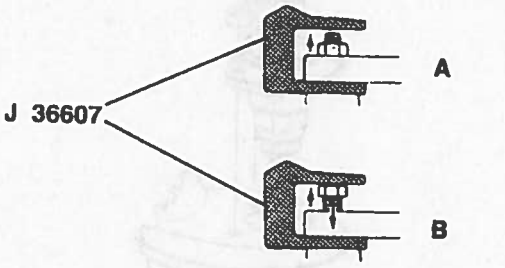


Fig. 29 Installing a new ball joint — late model



A. TOOL INSTALLED ON THE BALL JOINT
B. FORCING THE BALL STUD FROM THE KNUCKLE
85388030

Fig. 30 Position the separator tool over the ball joint, then back the off the nut to force the ball stud out of the knuckle

5. Remove the riveted ball joint from the control arm:
   a. Drill a ⅛ in. (3mm) hole, about ¼ in. (6mm) deep into each rivet.
   b. Then use a ½ in. (13mm) drill bit, to drill off the rivet heads.
   c. Using a pin punch and the hammer, drive out the rivets in order to free the ball joint from the control arm assembly, then remove the ball joint.

To install:

6. Position the joint in the control arm, then install the joint retaining nuts and bolts. Position the bolts threaded upward from under the control arm. Tighten the ball joint retainers to 17 ft. lbs. (23 Nm).
7. Remove the support from the steering knuckle, then install the ball joint to the knuckle. Make sure the joint is seated, then install the stud nut and tighten to 70 ft. lbs. (95 Nm). Install a new cotter pin.

➡When installing the cotter pin, never loosen the castle nut to expose the cotter pin hole, but DO NOT tighten more than an additional ⅙ turn.

8. Use a grease gun to lubricate the upper ball joint.
9. Install the tire and wheel assembly.
10. Remove the jackstands and carefully lower the vehicle.
11. Check and adjust the front end alignment, as necessary.

Stabilizer Bar

REMOVAL & INSTALLATION

2wd Vehicles

◗ See Figure 31

1. Raise and support the front of the vehicle safely using jackstands.
2. If necessary, remove the front wheels for additional access.
3. Loosen the nut from the top of one of the the link bolts, then remove the retainer and grommet so the stabilizer may be separated from the link bolt. If necessary, remove the link bolt, washers and grommets, but make sure all components remain in order on the link bolt once it is removed in order to ease installation.
4. Loosen the nut from the top of the other link bolt and separate it from the stabilizer in the same fashion. If the link bolt and components are completely removed, be sure to tag or arrange everything to assure installation on the same side.
5. Loosen and remove the bolts retaining the stabilizer brackets to the frame, then remove the stabilizer bar from the vehicle.
6. If necessary, remove the rubber bushings (insulators).

To install:

7. If removed, install the rubber bushings to the stabilizer bar, making sure they are positioned with the slits facing toward the front of the vehicle.
8. Position the stabilizer shaft, then install the brackets over the bushings to retain the shaft. Tighten the bracket bolts to 24 ft. lbs. (33 Nm).
9. Install the link bolts making sure the positioning of the grommets, retainers and washers is correct. If necessary, refer to the illustration for classification. But keep in mind the grommets are normally surrounded by washers/retainers or components (control arm or stabilizer).
10. Install the upper grommet, retainer and nut to the top of each link bolt, then tighten to 13 ft. lbs. (17 Nm).
11. If removed, install the front wheels.
12. Remove the jackstands and carefully lower the truck.

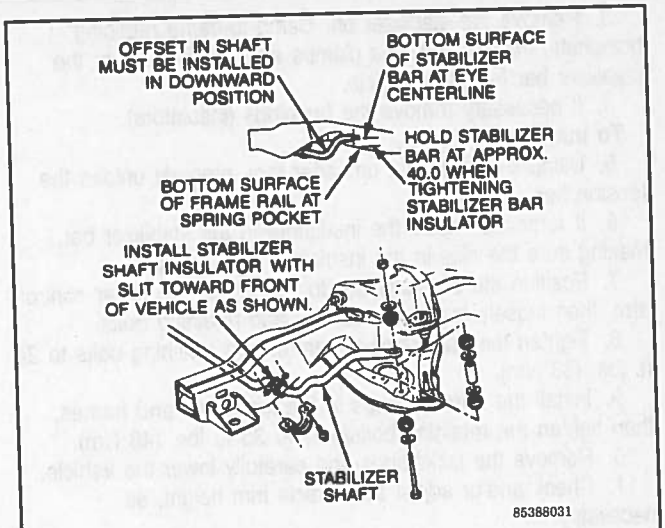

OFFSET IN SHAFT MUST BE INSTALLED IN DOWNWARD POSITION
BOTTOM SURFACE OF STABILIZER BAR AT EYE CENTERLINE
HOLD STABILIZER BAR AT APPROX. 40.0 WHEN TIGHTENING STABILIZER BAR INSULATOR
BOTTOM SURFACE OF FRAME RAIL AT SPRING POCKET
INSTALL STABILIZER SHAFT INSULATOR WITH SLIT TOWARD FRONT OF VEHICLE AS SHOWN.
STABILIZER SHAFT
85388031

Fig. 31 Front stabilizer bar mounting — 2wd vehicles

4wd Vehicles

◗ See Figures 32, 33 and 34

➡Installation of the stabilizer bar requires that the torsion bar be unloaded using a special unloader tool used during tension bar removal. Do not attempt this procedure without the unloader. For details on the unloader and its use, please refer to the tension bar procedure found earlier in this section.

1. Raise and support the front of the vehicle safely using jackstands.
2. Remove the stabilizer bar clamp-to-control arm retaining bolts, then remove the clamps.

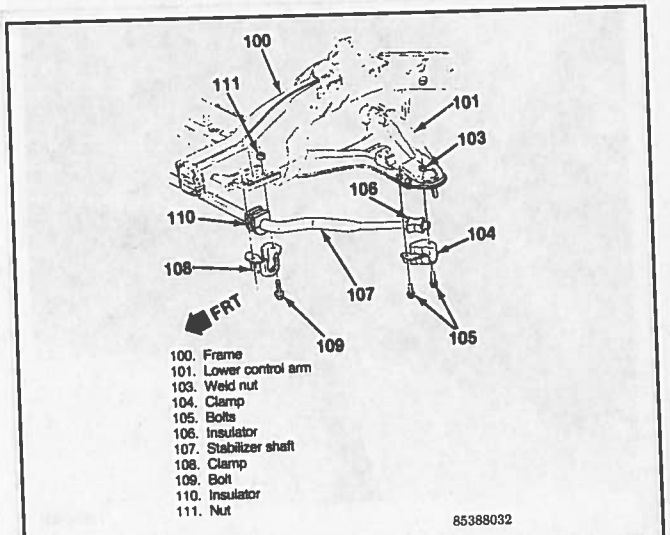


Fig. 32 Front stabilizer bar mounting — 4wd vehicles

3. Remove the stabilizer bar clamp-to-frame retaining bolts/nuts, then remove the clamps and carefully lower the stabilizer bar from the vehicle.
4. If necessary remove the bushings (insulators).

To install:

5. Using a tension bar unloader tool, properly unload the tension bar.
6. If removed, install the insulators to the stabilizer bar, making sure the slits in the insulators face forward.
7. Position the stabilizer bar to the frame and lower control arm, then loosely install the clamps and retaining bolts.
8. Tighten the bar clamp-to-control arm retaining bolts to 24 ft. lbs. (33 Nm).
9. Install the frame clamps to the insulators and frames, then tighten the retaining bolts/nuts to 35 ft. lbs. (48 Nm).
10. Remove the jackstands and carefully lower the vehicle.
11. Check and/or adjust the vehicle trim height, as necessary.

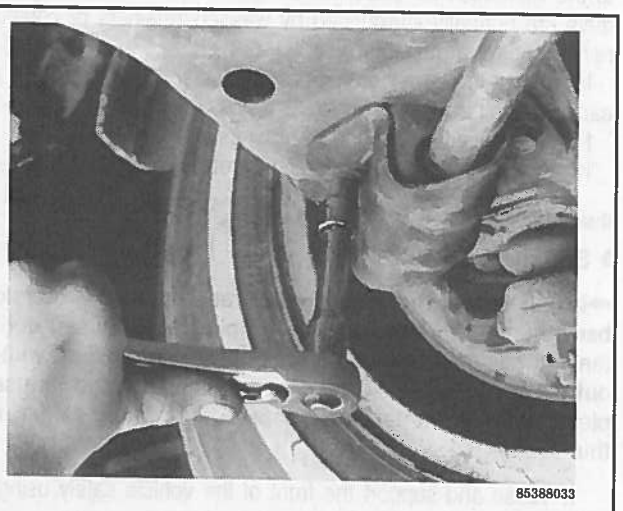


Fig. 33 When removing the 4wd stabilizer bar, first loosen the control arm clamp bolts

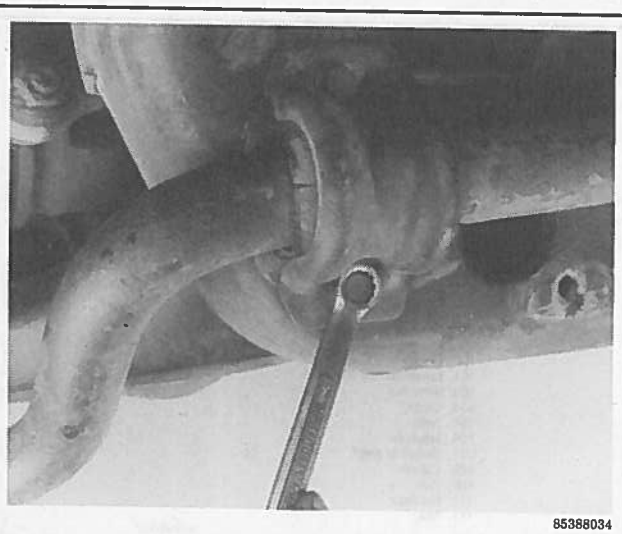


Fig. 34 Loosen and remove the frame clamp retainers

Upper Control Arm

REMOVAL & INSTALLATION

2wd Vehicles

See Figures 35, 36 and 37

➡The following procedure requires the use of a ball joint separator tool such as J-23742 or equivalent.

1. Raise and support the front of the vehicle safely by placing jackstands securely under the lower control arms. Because the vehicle's weight is used to relieve spring tension on the upper control arm, the floor stands must be positioned between the spring seats and the lower control arm ball joints for maximum leverage.

⁂CAUTION

With components unbolted, the jackstand is holding the lower control arm in place against the coil spring. Make sure the jackstand is firmly positioned and cannot move, or personal injury could result.

2. Remove the tire and wheel assembly.
3. Remove the brake caliper and support it from the vehicle using a coat hanger or wire. Make sure the brake line is not stretched or damaged and that the caliper's weight is NOT supported by the line.
4. Remove the cotter pin and retaining nut from the upper ball joint.
5. Position J-23742 or an equivalent ball joint separator tool between upper joint stud and the lower joint/control arm. Use the tool to separate the upper ball joint from the steering knuckle. Pull the steering knuckle free of the ball joint after removal.

➡After separating the steering knuckle from the upper ball joint, be sure to support the steering knuckle/hub assembly to prevent damaging the brake hose.

6. Remove the upper control arm-to-frame nuts and bolts, then lift and remove the upper control arm from the vehicle.

➡Tape the shims together and identify them to assure that they are re-installed in the same place

7. Clean and inspect the steering knuckle hole. Replace the steering knuckle if any out of roundness is noted.
8. If replacement is necessary, mount the control arm in a vise, then remove the pivot shaft nuts and washers. Use a control arm bushing fixture (C-clamp like tool) along with a slotted washer and a piece of pipe (slightly larger than the bushing) to remove the old bushings.

To install

9. If removed, position the pivot shaft to the control arm and install the bushing using the fixture tool, washer and a length of pipe with the same outer diameter as the bushing. Tighten the tool until the bushing is positioned on the shaft as shown in the illustration. Loosely install the bushing retaining nuts and washers. For 1987-93 vehicles, tighten bushing nuts to 85 ft. lbs. (115 Nm). For 1986 and earlier vehicles, wait

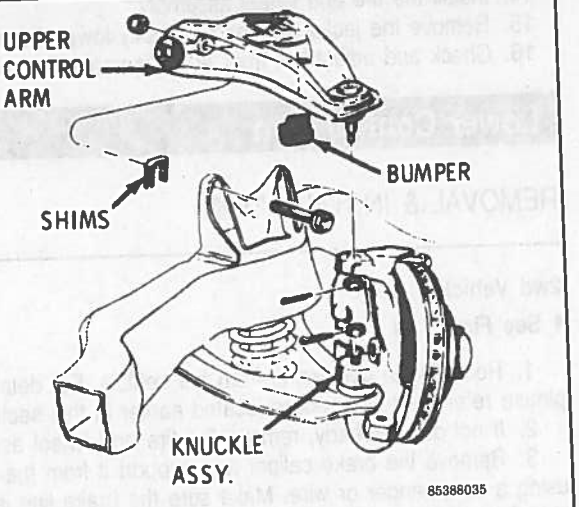


Fig. 35 Upper control arm mounting — 2wd vehicles

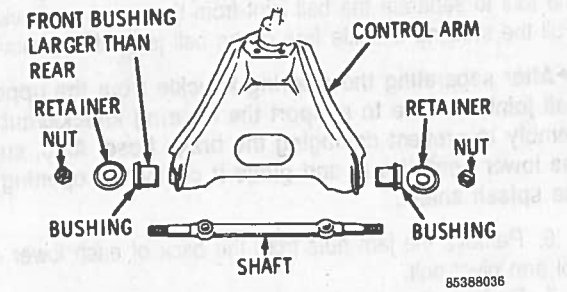


Fig. 36 Exploded view of the upper control arm and bushing components

until the control arm is installed with the vehicle's weight on the suspension.

10. Loosely install the control arm to the frame using the bolts and nuts. Position the shims as noted during removal, then tighten the retainers to 45 ft. lbs. (60 Nm) for vehicles through 1986 or to 65 ft. lbs. (88 Nm) for 1987-93 vehicles.

➨On most vehicles, the left upper control arm shaft must have the depression facing inboard.

11. Remove the support from the steering knuckle, then install the ball joint to the knuckle. Make sure the joint is seated, then install the stud nut and tighten to 65 ft. lbs. (90 Nm) for vehicles through 1986 or to 61 ft. lbs. (83 Nm) for 1987-93 vehicles. Install a new cotter pin.

➨When installing the cotter pin, never loosen the castle nut to expose the cotter pin hole.

12. Reposition and secure the brake caliper.
13. Install the tire and wheel assembly.
14. Remove the jackstands and carefully lower the vehicle.

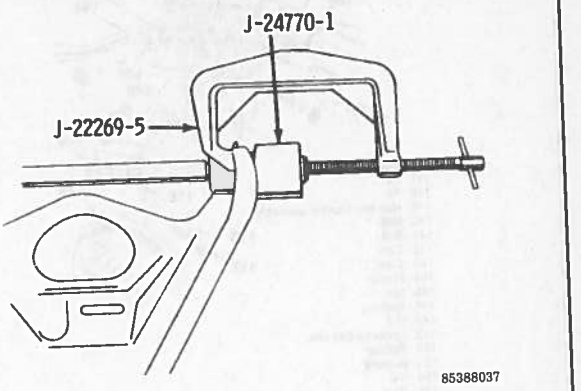


Fig. 37 Upper control arm bushing installation — 2wd vehicles

15. If the control arm bushings were replaced on 1986 and earlier vehicles, tighten the pivot shaft nuts to 65 ft. lbs. (88 Nm).
16. Check and adjust the front end alignment, as necessary.

4wd Vehicles

◗ See Figures 38 and 39

1. Raise and support the front of the vehicle safely using jackstands.
2. Remove the tire and wheel assembly.
3. Remove the cotter pin from the ball joint, then loosen the retaining nut.

➨After separating the steering knuckle from the upper ball joint, be sure to support the steering knuckle/hub assembly to prevent damaging the brake hose.

4. Position a suitable ball joint separator tool such as J-34026, or equivalent, then carefully loosen the joint in the steering knuckle. Remove the tool and the retaining nut, then remove the joint from the knuckle.

➨The 4wd vehicles covered by this manual do not use shims to adjust the front wheel alignment. Instead, the upper control arm bolts are equipped with cams which are rotated to achieve caster and camber adjustments. In order to preserve adjustment and ease installation, matchmark the cams to the control arm before removal. If the control arm is being replaced, transfer the alignment marks to the new component before installation.

5. Remove the front and rear nuts retaining the control arm retaining bolts to the frame, then remove the outer cams from the bolts.
6. Remove the bolts and inner cams, then remove the control arm from the vehicle.
7. If necessary, remove the retaining nut and the bumper from the control arm.
8. If the bushings are being replaced, use a suitable bushing service set to remove the bushings from the arm.

To install:

9. If removed, use the bushing service set to drive the new bushings into the control arm.

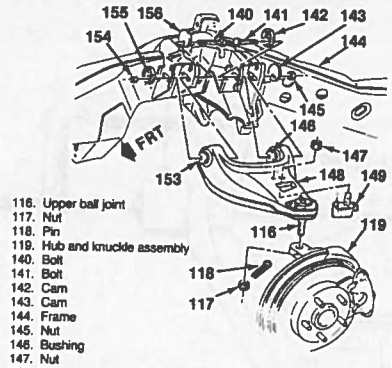


Fig. 38 Exploded view of the upper control arm mounting — 4wd vehicles

Fig. 39 Loosen the end retaining nuts from the upper control arm bolts

10. If removed, install the bumper and retaining nut to the control arm. Tighten the bumper retaining nut to 20 ft. lbs. (27 Nm).

11. Position the control arm to the vehicle, then install the retaining bolts (from the inside of the frame brackets facing outward) and the inner cams. The inner cams must be positioned on the bolts before they are inserted through the control arm and frame brackets.

12. Position the outer cams over the retaining bolts, then install the nuts to the ends of the bolts at the front and rear of the control arm. Align the cams to the reference marks made earlier, then tighten the end nuts to 70 ft. lbs. (95 Nm).

13. Remove the support from the steering knuckle, then install the ball joint to the knuckle. Make sure the joint is seated, then install the stud nut and tighten to 70 ft. lbs. (95 Nm). Install a new cotter pin.

➡When installing the cotter pin, never loosen the castle nut to expose the cotter pin hole, but DO NOT tighten more than an additional ⅙ turn.

14. Install the tire and wheel assembly.
15. Remove the jackstands and carefully lower the vehicle.
16. Check and adjust the front end alignment, as necessary.

Lower Control Arm

REMOVAL & INSTALLATION

2wd Vehicles

◗ See Figure 40

1. Remove the coil spring from the vehicle. For details, please refer to the procedure located earlier in this section.
2. If not done already, remove the tire and wheel assembly.
3. Remove the brake caliper and support it from the vehicle using a coat hanger or wire. Make sure the brake line is not stretched or damaged and that the caliper's weight is NOT supported by the line.
4. Remove the cotter pin and retaining nut from the upper ball joint.
5. Position J-23742 or an equivalent ball joint separator tool between upper joint stud and the upper joint/control arm. Use the tool to separate the ball joint from the steering knuckle. Pull the steering knuckle free of the ball joint after removal.

➡After separating the steering knuckle from the upper ball joint, be sure to support the steering knuckle/hub assembly to prevent damaging the brake hose. Also, support the lower control arm and guide it out of the opening in the splash shield.

6. Remove the jam nuts from the back of each lower control arm pivot bolt.
7. Remove the pivot bolts (noting the direction in which they are facing), then remove the control arm from the vehicle.
8. If the bushings are beings replaced, use a suitable bushing service set to remove the bushings from the control arm. The front bushing is normally flared and the flare must be driven down flush with the rubber using a blunt chisel before attempting removal.

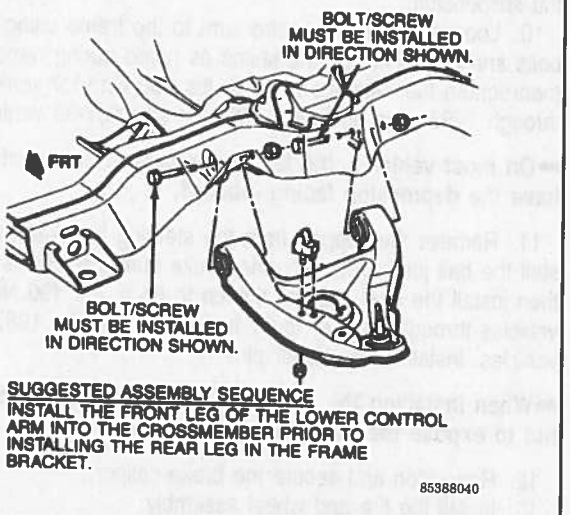

BOLT/SCREW
MUST BE INSTALLED
IN DIRECTION SHOWN.
FRT
BOLT/SCREW
MUST BE INSTALLED
IN DIRECTION SHOWN.
SUGGESTED ASSEMBLY SEQUENCE
INSTALL THE FRONT LEG OF THE LOWER CONTROL ARM INTO THE CROSSMEMBER PRIOR TO INSTALLING THE REAR LEG IN THE FRAME BRACKET.
85388040

Fig. 40 Lower control arm mounting — 2wd vehicles

To install:

9. If the bushings were removed, use the bushing service set to install them to the control arms. If the front bushing is the flared type, use a flaring tool to produce an approximate flare of 45 degrees.
10. Position the control arm to the vehicle.
11. Install the pivot bolts as noted during removal. For most vehicles covered by this manual, that means they should be installed with the heads forward, facing the rear.
12. Install the jam nuts and tighten to 94 ft. lbs. (127 Nm) for the front nut on vehicles through 1992, and/or to 67 ft. lbs. for the rear nut on vehicles through 1992 or both nuts on 1993 vehicles.
13. Remove the support from the steering knuckle, then install the ball joint to the knuckle. Make sure the joint is seated, then install the stud nut and tighten to 65 ft. lbs. (90 Nm) for vehicles through 1986 or to 61 ft. lbs. (83 Nm) for 1987-93 vehicles. Install a new cotter pin.

➡When installing the cotter pin, never loosen the castle nut to expose the cotter pin hole.

14. Reposition and secure the brake caliper.
15. Install the tire and wheel assembly.
16. Remove the jackstands and carefully lower the vehicle.
17. Check and adjust the front end alignment, as necessary.

4wd Vehicles

◗ See Figure 41

1. Raise and support the front of the vehicle safely using jackstands.
2. Remove the tire and wheel assembly.
3. Remove the stabilizer bar. For details, please refer to the procedures earlier in this section. Installation of the stabilizer bar will require use of a torsion bar unloader tool.
4. Remove the shock absorber.
5. Remove the lower control arm-to-frame nuts, then withdraw the bolts, noting the direction they were facing for installation purposes. Remove the lower control arm from the truck.
6. If necessary, use a suitable bushing service set to remove the bushings from the lower control arm.

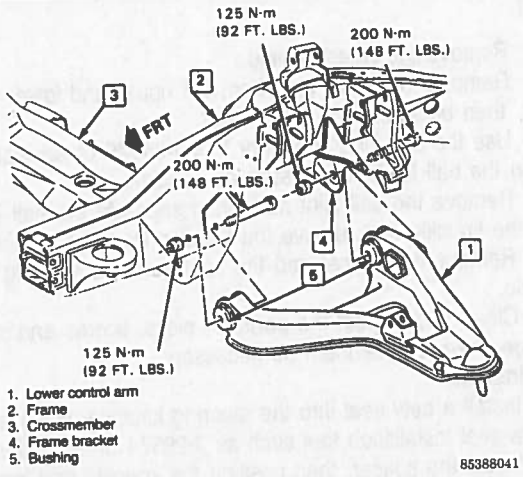


Fig. 41 Lower control arm mounting — early model 4wd vehicles (late model similar)

To install:

7. If removed, use the service set to install new bushings to the lower control arm.
8. Position the control arm in the vehicle, installing the front leg of the lower control arm into the crossmember before installing the rear leg into the frame bracket.
9. Insert the control arm retaining bolts in the direction noted during removal. For most vehicles, they should be inserted from the rear of the truck facing forward. On vehicles through 1992 the bolts may be threaded into a fitting on the frame/crossmember, if so they should be tightened to 148 ft. lbs. (200 Nm) while the suspension is at normal trim height.

➡When tightening the lower control arm fasteners for these vehicles, the suspension must be held at normal trim height. This can be accomplished in various ways, including using a floor jack or jackstands to support the control arm at the proper height or loosely tightening the fasteners, installing the remaining components and placing the vehicle's weight on the wheels. If the second option is chosen, make sure the fasteners are tightened sufficiently to prevent components from pulling apart while the vehicle is supported by the wheels. Also, for safety should components come loose, position jackstands under the vehicle, in contact with the suspension but not taking any significant weight away from the wheels.

10. Install the lower control arm retaining nuts and tighten them with the suspension at normal trim height to 92 ft. lbs. (125 Nm) for vehicles through 1992 or to 70 ft. lbs. (95 Nm) for 1993 vehicles.
11. Install the shock absorber.
12. Properly unload the torsion bar, then install the stabilizer bar. Adjust the torsion bar, as necessary. For details, please refer to the procedures located earlier in this section.
13. Install the tire and wheel assembly.
14. Remove the jackstands and carefully lower the vehicle.

Steering Knuckle and Spindle

REMOVAL & INSTALLATION

2wd Vehicles

◗ See Figure 42

1. Raise and support the front of the vehicle frame using jackstands.

➡When supporting the vehicle on jackstands, DO NOT place the jackstands under the lower control arms as spring tension will be used to help separate the ball joint studs from the knuckle. Place the jackstands under the frame and use a suitable floor jack under the control arm for safety.

2. Remove the tire and wheel assembly.
3. Remove the brake caliper from the steering knuckle and hang it from the vehicle using wire or a coat hanger. Make sure the brake line is not stretched or otherwise damaged.
4. Remove the grease cup, the cotter pin, the castle nut and the hub-and-rotor assembly. For details, please refer to

the the brake rotor (disc) procedure located in Section 9 of this manual.

5. Remove the splash shield-to-steering knuckle bolts and separate the shield from the knuckle.

6. At the tie rod end-to-steering knuckle stud, remove the cotter pin and the nut. Use a suitable jawed tie rod end puller tool such as J-6627, J-24319-01 or equivalent to separate the tie rod end from the steering knuckle.

7. Position a floor jack under the spring seat of the lower control arm in order to retain the spring seat. Raise the floor jack until it just contacts the arm.

8. Remove the cotter pins from the upper and lower ball joint studs, then loosen the retaining nuts.

9. Use a ball joint separator such as J-23742 or equivalent to separate the upper ball joint from the steering knuckle. Remove the nut and pivot the upper control arm free of the knuckle.

10. Use the ball joint tool to separate the lower ball joint from the steering knuckle, then remove the nuts and lift the steering knuckle from the lower control arm.

11. Clean and inspect the steering knuckle and spindle for signs of wear or damage; if necessary, replace the steering knuckle. If any out-of-roundness is found in the tapered knuckle hole it MUST be replaced.

To install:

12. Position the steering knuckle onto the lower ball joint stud, then lift the upper control arm to insert the upper ball joint stud into the steering knuckle. Loosely install both ball joint stud nuts to hold the components in position.

13. Properly tighten the upper and lower ball joint stud nuts, then install new cotter pins. For details, please refer to the procedures located earlier in this section.

➡When installing a cotter pin, never loosen the castle nut to expose the cotter pin hole.

14. If equipped, position a new steering knuckle gasket.

15. Install the splash shield to the knuckle and secure the retaining bolts.

16. Install the tie rod end to the steering knuckle, then tighten the stud nut to specification and install a new cotter pin.

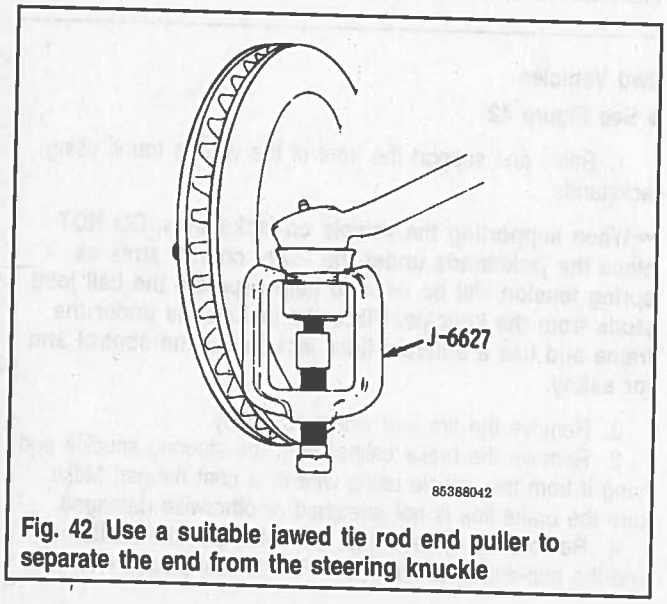


Fig. 42 Use a suitable jawed tie rod end puller to separate the end from the steering knuckle

17. Install the hub and rotor assembly and castle nut. Properly adjust the wheel bearings, then install a new cotter pin followed by the grease cup. For wheel bearing adjustment procedures, please refer to Section 1 of this manual.

18. Remove the support, then reposition and secure the brake caliper.

19. Install the tire and wheel assembly.

20. Remove the jackstands and carefully lower the vehicle.

21. Check and/or adjust the front end alignment, as necessary.

4wd Vehicles

◗ See Figures 43, 44, 45, 46, 47, 48, 49 and 50

➡The following procedure requires the use a universal steering linkage puller J-24319-01, an axle shaft boot seal protector J-28712, a ball joint separator tool J-34026 and a steering knuckle seal installation tool J-28574 or their equivalents.

1. Raise and support the front of the vehicle safely using jackstands.

2. Properly unload the torsion bar. For details, please refer to the torsion bar procedure located earlier in this section.

3. Remove the tire and wheel assembly.

4. Install an axle shaft boot seal protector to the tri-pot axle joint.

5. Remove the brake caliper and support aside using wire or a coat hanger. Make sure the brake line is not stretched or damaged.

6. Remove the brake disc from the wheel hub.

7. At the wheel hub, remove the cotter pin, the retainer, the castle nut, the thrust washer. If necessary, hold the hub from turning using a prybar across 2 installed lug nuts.

8. Remove the cotter pin and castle nut from the tie-rod end, then use the steering linkage puller to separate the tie rod end from the knuckle..

9. Remove the hub/bearing assembly-to-steering knuckle retaining bolts from the rear of the knuckle, then remove the hub/bearing assembly from the steering knuckle.

➡When removing the steering knuckle and wheel hub, be careful not to damage the splined surface of the half shaft.

10. Remove the splash shield.

11. Remove the cotter pins from the upper and lower ball joints, then back off the castle nut(s).

12. Use the ball joint separator tool J-34026 or equivalent to loosen the ball joints in the steering knuckle.

13. Remove the ball joint nuts, then separate the ball joints from the knuckle and remove the knuckle from the vehicle.

14. Remove the spacer and the seal from the steering knuckle.

15. Clean and inspect the parts for nicks, scores and/or damage, then replace them as necessary.

To install:

16. Install a new seal into the steering knuckle, using a knuckle seal installation tool such as J-28574 or equivalent.

17. Install the spacer, then position the knuckle and insert the upper and lower ball joints.

18. Install the upper and lower ball joint stud nuts and tighten to specification, then install new cotter pins. For details,

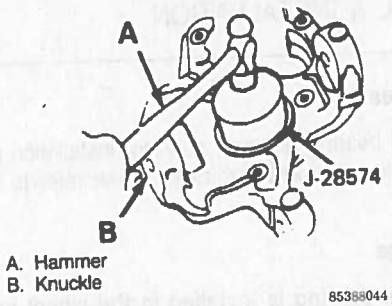


Fig. 43 Installing a new seal on the 4wd steering knuckle

please refer to the ball joint procedures located earlier in this section.

19. Position the splash shield to the steering knuckle, then install the wheel hub/bearing assembly while aligning the threaded holes. Tighten the hub/bearing assembly retaining bolts to 86 ft. lbs. (116 Nm).
20. Install the tie rod end to the steering knuckle, then secure using the retaining nut and cotter pin.
21. Install the thrust washer and the castle nut to the drive axle and tighten to 180 ft. lbs. (245 Nm). Install the retainer and a new cotter pin (DO NOT back off the torque specification).
22. Install the brake disc.
23. Reposition and secure the brake caliper.
24. Remove the axle boot protector and the torsion bar unloader tool.
25. Install the tire and wheel assembly.
26. Remove the jackstands and carefully lower the truck.

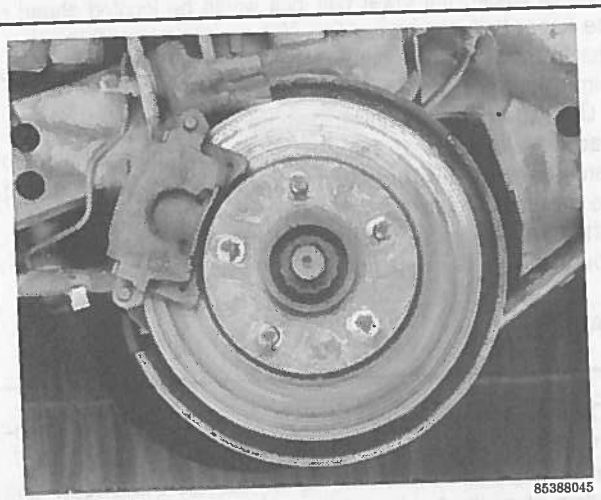


Fig. 44 Remove the wheel in order to access the steering knuckle components

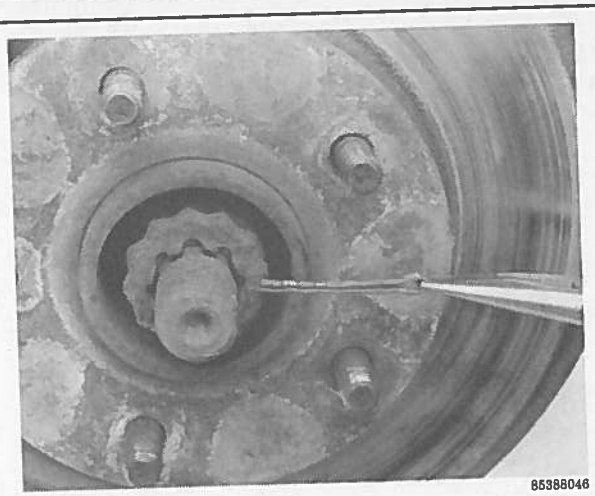


Fig. 45 Remove the cotter pin from the drive axle end nut and retainer

Fig. 46 Remove the retainer for access to the end nut

Fig. 47 Loosen the drive axle nut — here the caliper is installed so a drift could be inserted to keep the disc from spinning

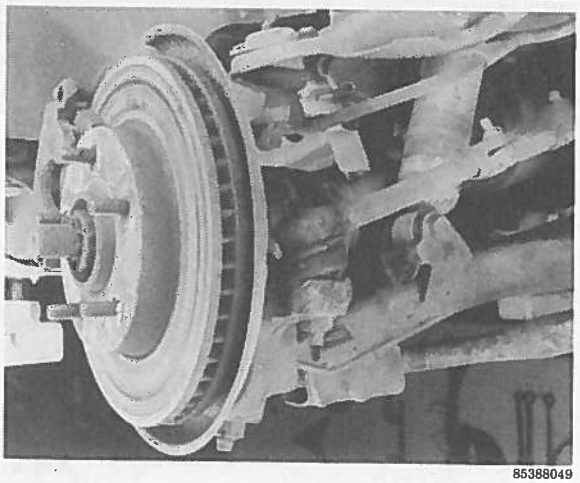


Fig. 48 The various ball studs must be removed from the steering knuckle as well

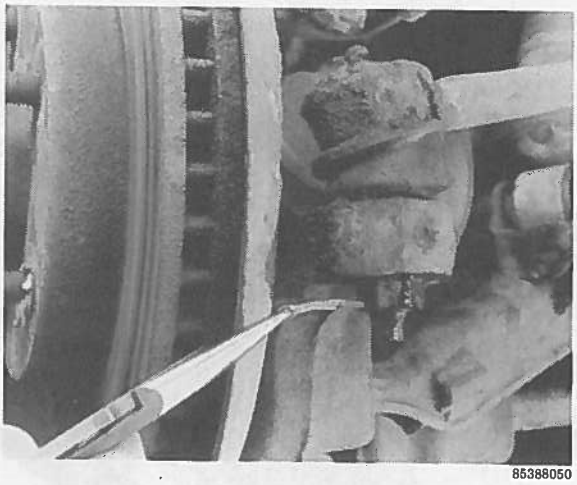


Fig. 49 Remove the cotter pin (in this case from the tie rod end)

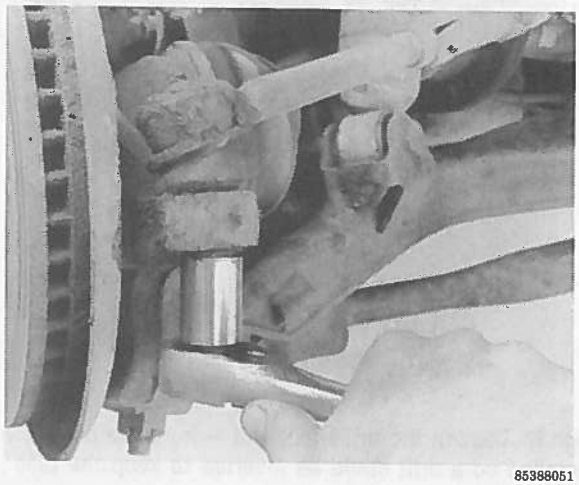


Fig. 50 Loosen and remove the retaining nut so the tie rod may be separated

Front Wheel Bearings

REMOVAL & INSTALLATION

2wd Vehicles

For wheel bearing removal, packing, installation and adjustment procedures on 2wd vehicles, please refer to Section 1 of this manual.

4wd Vehicles

➡The wheel bearing is installed in the wheel hub assembly and is serviced by replacement only.

Please refer to the appropriate portion of the steering knuckle procedure earlier in this section in order to replace the wheel hub assembly.

Front End Alignment

◗ See Figures 51 and 52

CASTER

Caster is a measure of the angle between the steering axis and vertical, as viewed from the side of the vehicle when the wheels are in the straight ahead position. Stated another way, it is the tilting of the front steering axis either forward or backward from the vertical. A backward tilt is said to be positive (+) and a forward tilt is said to be negative (-).

Although is it measured using a special instrument, it can usually be seen by observing the location of the upper and lower control arm ball joints. A line drawn through the center of these 2 points represents the steering axis. When looking straight downward from the top of the upper control arm you can see if the ball joints are not aligned, indicating that the caster angle is more or less than 0 degrees. If vehicle has positive caster, the lower ball joint would be located ahead of the upper ball joint center line. If the vehicle has negative caster, the lower ball joint would be located behind the upper joint center line.

On 2wd trucks, the caster may be adjusted by changing placement of shims on the 2 upper control arm pivot shaft-to-frame bolts. On 4wd trucks, the caster is adjusted by turning the adjustment cams. To increase positive caster on a 4wd vehicle, move the front cam lobe inboard and the rear cam lobe outboard.

CAMBER

Camber is the measure of wheel tilt from the vertical direction, when the wheel is viewed from the rear of the vehicle. Camber is negative when the top of the wheel is inboard and positive when the top is outboard. Always check for bent, damaged or worn suspension components before determining that adjustment is necessary. The amount of tilt is measured in degrees from the vertical and this measurement is called the camber angle.

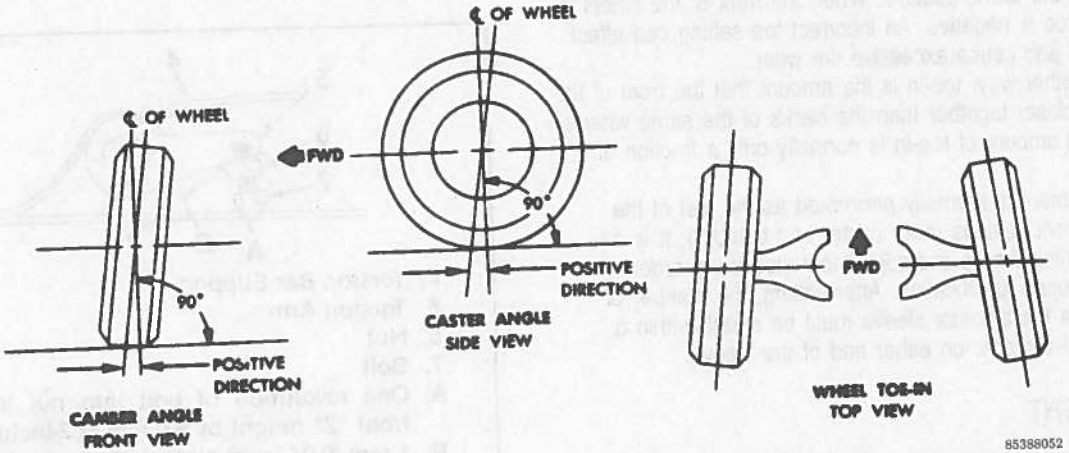
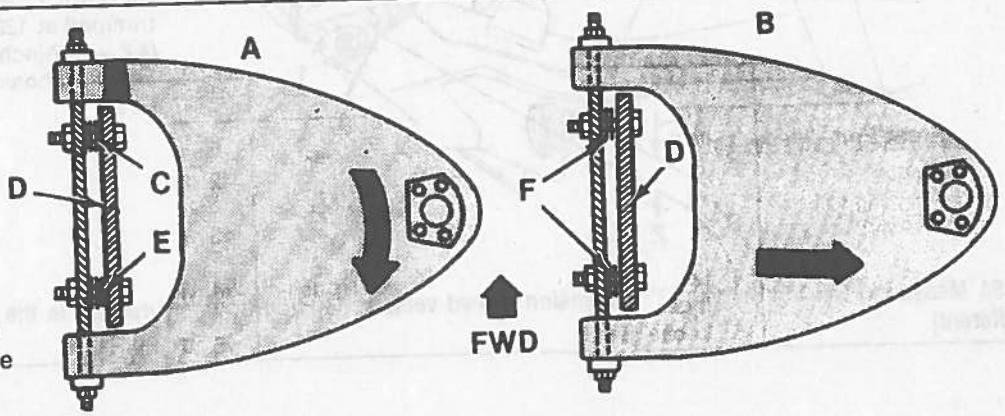


Fig. 51 Standard front wheel alignment measurements



A. Caster
B. Camber
C. Subtract shims here to increase caster
D. Frame
E. Add shims here to increase caster
F. Subtract shims equally to increase camber

Fig. 52 Camber and caster adjustment — 2wd vehicles

On 2wd vehicles, camber is adjusted by removing or adding shims at both front and rear pivot shaft-to-frame contact points. To increase camber, subtract shims equally from both locations. On 4wd vehicles, adjustment is once again made using the adjustment cams.

TOE-IN

Toe is a measurement of how far a wheel is turned in or out from the straight ahead direction. When the front of the wheel is turned in, the toe is positive. When the front of the wheel is turned out, toe is negative. An incorrect toe setting can affect steering feel and cause excessive tire wear.

Stated another way, toe-in is the amount that the front of the wheels are closer together than the backs of the same wheels.

The actual amount of toe-in is normally only a fraction of a degree.

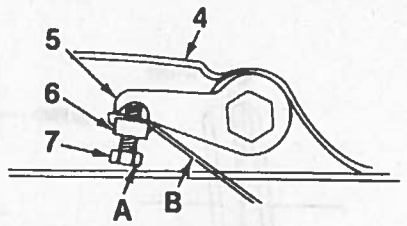
Toe adjustment is normally performed as the last of the wheel alignment settings (after caster and camber). It is adjusted by turning the tie rod adjustment sleeves in order to obtain the proper specification. After setting, the number of threads inside the adjuster sleeve must be equal, within a tolerance of 3 threads, on either end of the sleeve.

TRIM HEIGHT

See Figures 53, 54 and 55

The trim height "Z" measurement is used as an indicator if the front suspension is properly set-up. The height may be checked following suspension repairs or if damage to the suspension is suspected, such as after hitting a large pot hole. Refer to the illustrations for proper measurements.

On 2wd vehicles, if the measurement is out of specification, check for worn or damaged suspension components. On 4wd vehicles, some adjustment is possible through the torsion bar adjuster. Turning the adjustment bolt one full revolution will increase/decrease "Z" height by 0.2 in. (6.0mm). If a proper adjustment cannot be obtained, check for worn or damaged components. The proper specification for most 4wd models is 4.6-5.0 in. (116-128mm), but for the MFI-Turbo the dimension should be 2.3-2.7 in. (57.6-69.6mm).



4. Torsion Bar Support
5. Torsion Arm
6. Nut
7. Bolt

A. One revolution of bolt into nut increases front "Z" height by 6.0 mm (0.2-inch).
B. 1 mm (0.04-inch) clearance must be provided between adjuster arm and nut after adjustment.

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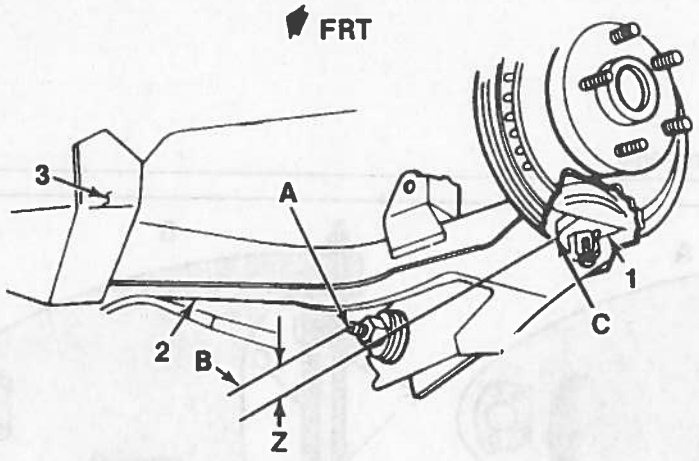
Fig. 53 Adjusting the trim height on 4wd vehicles



1. Knuckle and Hub Assembly
2. Lower Control Arm
3. Frame

A. Center Line of Pivot Bolt
B. Parallel to Ground
Z. All Curb "Z" Heights to be trimmed at 122.0 ± 6.0 mm (4.8 ± 0.2-inch)
C. Lowest inboard edge of knuckle.

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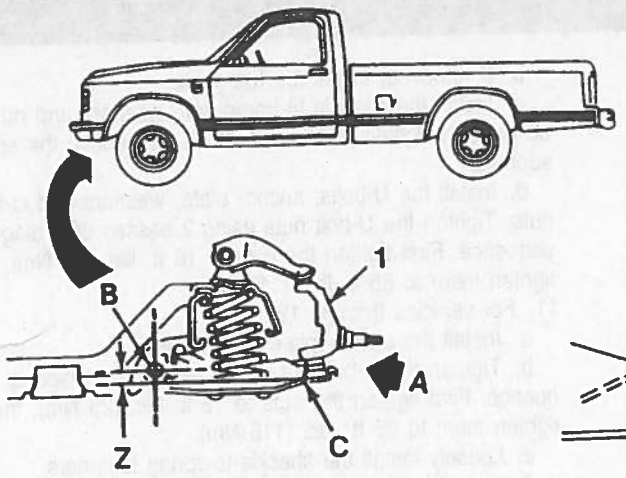
Fig. 54 Measuring the trim height "Z" dimension — 4wd vehicles (MFI-Turbo measurement is the same, but specification is different)



1. Steering Knuckle and Hub Assembly
B. Center Line of Front Lower Control Arm Bolt
Z. Z Height. All "Z" heights to be trimmed at 73.0 ± 6.0 mm (2.8 ± 0.2-inch)
C. Lower Inboard Corner of Ball Joint

Fig. 55 Measuring the trim height "Z" dimension — 2wd vehicles

WHEEL ALIGNMENT

Year	Caster		Camber		Toe-in (in.)	Steering Axis Inclination (deg.)
	Range (deg.)	Preferred Setting (deg.)	Range (deg.)	Preferred Setting (deg.)		
1982	0–4P	2P	0.7N–2.3P	0.8P	1/16	NA
1983	0–4P	2P	0.7N–2.3P	0.8P	1/16	NA
1984	1P–3P	2P	0–1.6P	0.8P	1/16	NA
1985	1P–3P	2P	0–1.6P	0.8P	1/16	NA
1986	1P–3P	2P	0–1.6P	0.8P	1/16	NA
1987	1P–3P	2P	0–1.6P	0.8P	1/16	NA
1988	1P–3P	2P	0–1.6P	0.8P	1/16	NA
1989	1P–3P	2P	0–1.6P	0.8P	1/16	NA
1990	1P–3P	2P	0–1.6P	0.8P	1/16	NA
1991-92	1P–3P①	2P①	0–1.6P①	0.8P①	1/16①	NA①
	2.5P–4.5P②	3.5P②	0.8N–0.8P②	0②	1/16②	NA②
1993	1P–3P	2P	0–1.6P	0.8P	1/16	NA

① Except MFI-Turbo
② MFI-Turbo

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REAR SUSPENSION

The rear suspension system consists of 3 major components: The double acting shock absorbers, variable rate multi-leaf springs and the solid rear axle assembly. The multi-leaf springs are connected to the frame by a hanger assembly with integral bushings in the front and a shackle assembly with integral bushings in the rear. In response to different road and payload conditions, the shackle assembly allows the leaf spring to "change its length". The rear axle is connected to both the leaf springs and the shock absorbers by various attaching parts.

➦**For rear axle service procedures, please refer to Section 7 of this manual.**

Leaf Springs

REMOVAL & INSTALLATION

◗ **See Figures 56 and 57**

➦**The following procedure requires the use of two sets of jackstands.**

1. Raise and support the rear frame of the vehicle safely using jackstands. Support the rear axle with the second set of jackstands.

➦**When supporting the rear of the vehicle, support the axle and the body separately in order to relieve the load on the rear spring.**

2. Remove the tire and wheel assembly.
3. Remove the shock absorber.
4. For vehicles through 1988:
   a. At the rear of the spring, loosen (but DO NOT remove) the shackle-to-frame bolt and the shackle-to-spring bolt.
   b. Remove the nut and bolt from the front hanger, then carefully disconnect the spring from the hanger.
   c. Support the spring, then remove the shackle.
   d. Remove the U-bolts and anchor plate.
5. For 1989-93 vehicles:
   a. Remove the U-bolt nuts, washers, anchor plate and bolts.
   b. On 1993 vehicles, remove the spare tire, if equipped.
   c. Remove the shackle-to-frame bolt, washers and nut.
   d. For 1993 vehicles, remove the fuel tank, if necessary. For details, please refer to Section 5 of this manual.
   e. Remove the front bracket nut, washers and bolt.
6. Carefully remove the spring from the vehicle.
7. If necessary on 1989 and later vehicles, remove the shackle-to-spring nut, washers and bolts, then remove the shackle from the spring.

To install:

8. If removed on 1989 and later vehicles, install the shackle to the rearward spring eye using the bolt, washers and nut, but do not fully tighten at this time.
9. Position the spring assembly to the vehicle.
10. For 1989-93 vehicles:
    a. Install the spring to the front bracket using the retaining bolt, washers and nut, but do not fully tighten at this time.
    b. If removed, install the fuel tank.
    c. Install the shackle-to-frame bolt, washers and nut, but do not fully tighten at this time. If used, remove the spring support.
    d. Install the U-bolts, anchor plate, washers and U-bolt nuts. Tighten the U-bolt nuts using 2 passes of a diagonal sequence. First tighten the nuts to 18 ft. lbs. (25 Nm), then tighten them to 85 ft. lbs. (115 Nm).
11. For vehicles through 1988:
    a. Install the anchor plate and U-bolts.
    b. Tighten the U-bolts using 2 passes of a diagonal sequence. First tighten the nuts to 18 ft. lbs. (25 Nm), then tighten them to 85 ft. lbs. (115 Nm).
    c. Loosely install the shackle-to-spring fasteners.
    d. Loosely install the spring to the front hanger.
12. Position the axle to achieve an approximate gap of 6.46-6.94 in. (164-176mm) between the axle housing tube and the metal surface of the rubber frame bumper bracket. Measure from the housing between the U-bolts to the metal part of the rubber bump stop on the frame.
13. While supporting the axle in this position, torque the front and rear spring mounting fasteners to 88 ft. lbs. (120 Nm) for vehicles through 1988 or to 92 ft. lbs. (125 Nm) for 1989-93 vehicles.
14. Install the shock absorber.
15. Remove the jackstands and carefully lower the vehicle.

Shock Absorbers

TESTING

There are 2 possible clues that the shock absorbers are worn and may need replacement. The first is how the vehicle rides and the second is how the shocks appear. The shocks should be checked if the ride of your vehicle has become increasingly bouncy or if oil is visible on the shock, indicating possible fluid leakage.

Visually inspect the shock absorber if trouble or wear is suspected. If the shock absorber is covered with oil and there is evidence of leakage, the shock is defective and should be replaced.

If there is no sign of excessive leakage (a small amount of weeping is normal) but the ride is still suspect, bounce the truck at one corner by pressing down on the rear bumper and releasing. When you have the truck bouncing as much as you can, release the fender or bumper. The truck should stop bouncing after the first rebound. If the bouncing continues past the center point of the bounce more than once, the shock absorbers are worn and should be replaced.

REMOVAL & INSTALLATION

◗ **See Figures 58 and 59**

1. Raise and support the rear of the truck safely using jackstands. Support the rear axle securely using a jackstands

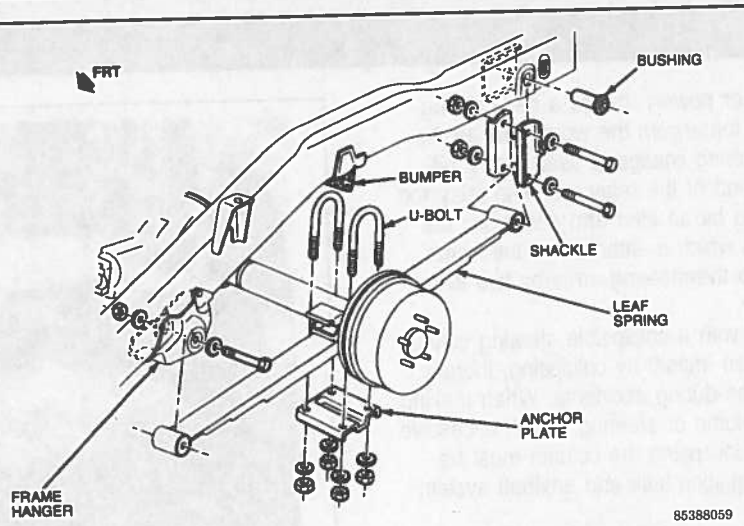


Fig. 56 Rear leaf spring and axle mounting

Fig. 58 Loosen the retainers from the upper shock mount — a backup wrench is usually needed

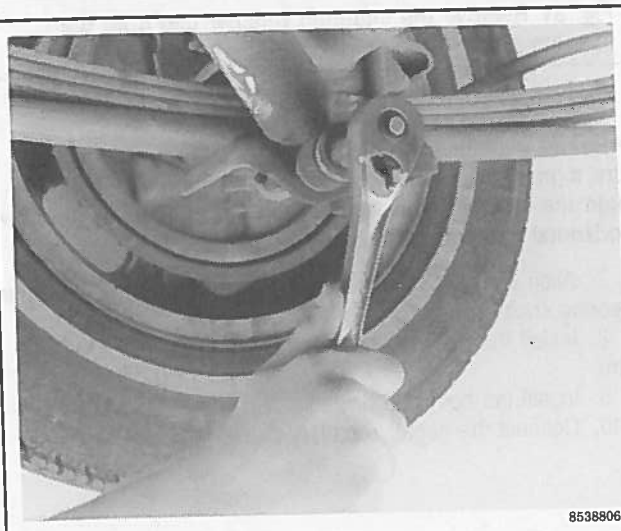


Fig. 59 Loosen and remove the lower shock mount

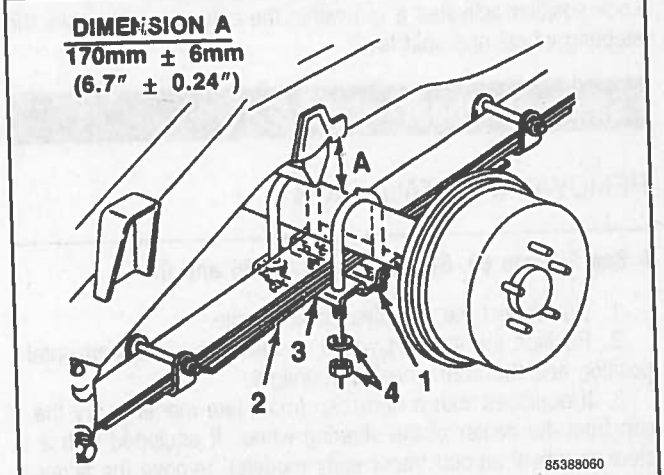


Fig. 57 Leaf spring U-bolts tighten sequence and axle tube-to-bumper bracket dimension

or a floor jack. The axle must be supported to prevent overextension and damage to the brake lines once the shock is removed.

2. Remove the shock absorber-to-frame retainers at the top of the shock.

3. Remove the shock-to-axle retainers at the bottom of the shock.

4. Remove the shock absorber from the vehicle.

To install:

5. Position the shock in the vehicle and loosely install the upper mounting fasteners to retain it.

6. Align the lower-end of the shock absorber with the axle mounting, then loosely install the retainers.

7. Torque the upper shock absorber retainers to 15 ft. lbs. (20 Nm) for vehicles through 1988 or to 17 ft. lbs. (23 Nm) for 1989-93 vehicles. Then tighten lower shock absorber fastener to 50 ft. lbs. (70 Nm) for vehicles through 1988 or to 47 ft. lbs. (64 Nm) for 1989-93 vehicles.

8. Remove the jackstands and carefully lower the vehicle.

STEERING

The steering box (manual or power) utilizes a recirculating ball system, which transmits force from the worm gear to the sector gear. A relay type steering linkage is used with a pitman arm connected to one end of the relay rod. The relay rod is supported on the other end by an idler arm assembly; the idler arm pivots on a support which is attached to the frame. The relay rod is connected to the steering arms by two adjustable tie rods.

These trucks are equipped with a collapsible steering column which is designed to absorb an impact by collapsing, thereby reducing possible chest injuries during accidents. When making any repairs to the steering column or steering wheel, excessive pressure or force capable of collapsing the column must be avoided. The ignition switch, ignition lock and antitheft system are built into each column.

On the automatic transmission, the ignition key cannot be removed unless the shift lever is in the Park position and the ignition switch is in the Lock position. Placing the key in the Lock position activates a rod within the column which locks the steering wheel and shift lever.

Steering Wheel

REMOVAL & INSTALLATION

See Figures 60, 61, 62, 63, 64, 65, 66 and 67

1. Disconnect the negative battery cable.
2. Position the steering wheel so that it is in the horizontal position and the front wheel are straight.
3. If equipped with a horn cap (most late models), pry the cap from the center of the steering wheel. If equipped with a steering wheel shroud (most early models), remove the screw from the rear of the steering wheel and remove the shroud.

If the horn cap or shroud is equipped with an electrical connector it must be disengaged in order to remove the cap/shroud from the steering column.

4. Remove the steering wheel-to-steering shaft retainer clip (snapring), then loosen and remove the nut.

Since the steering column is designed to collapse upon impact, NEVER hammer on it!

5. Matchmark the relationship of the steering wheel to the steering shaft. Some late model vehicles may already be equipped with one or more alignment marks. If not, make your own using a permanent marker.
6. Using a suitable steering wheel puller, such as No. J-1859-03 or equivalent, carefully draw the wheel from the steering column.

Fig. 60 On vehicles equipped with a steering wheel shroud, loosen the retainer and remove the shroud

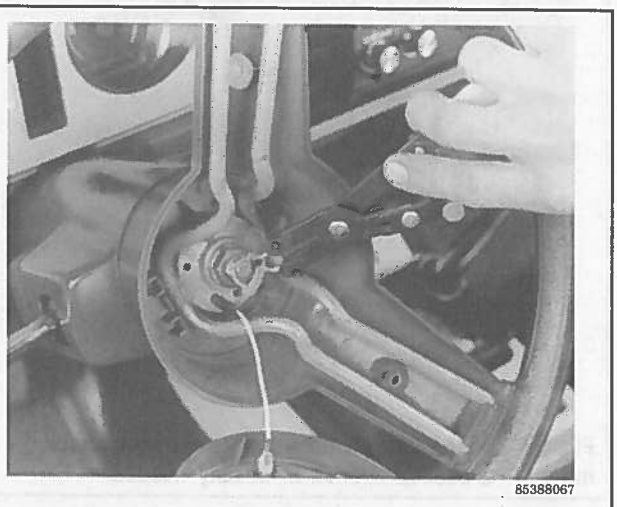


Fig. 61 Remove the snapring retainer clip from the steering shaft

To install:

Before installing the steering wheel, be sure that the turn signal switch is in the Neutral position. DO NOT misalign the steering wheel more than 0.8 in. (20mm) from the horizontal centerline.

7. Align the matchmarks and carefully fit the wheel onto the steering shaft splines.
8. Install the retaining nut and tighten to 30 ft. lbs. (40 Nm).
9. Install the horn cap or pad.
10. Connect the negative battery cable.

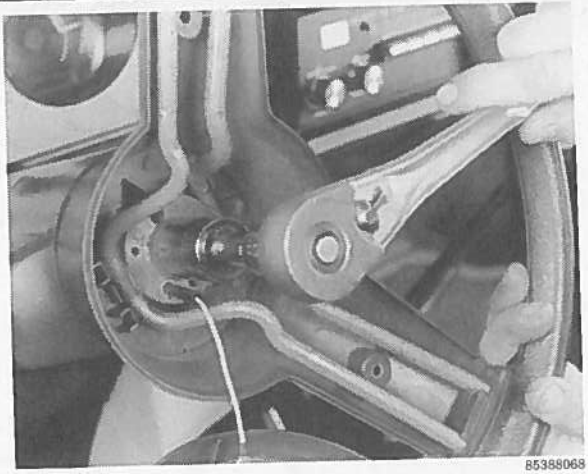


Fig. 62 Once the clip is removed, loosen and remove the wheel retaining nut

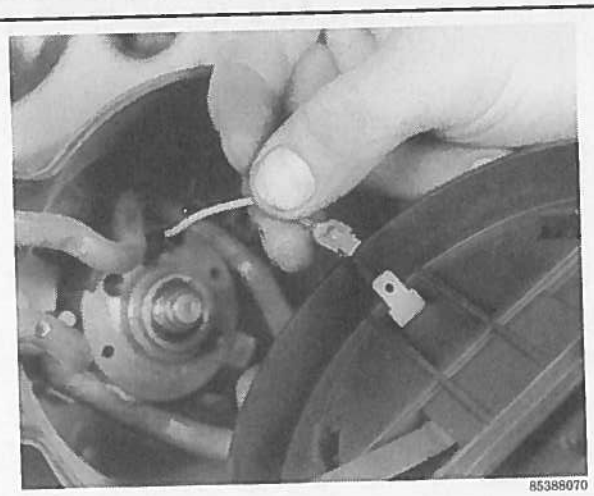


Fig. 65 If the shroud is equipped with a wiring lead it must be disconnected in order to remove the shroud

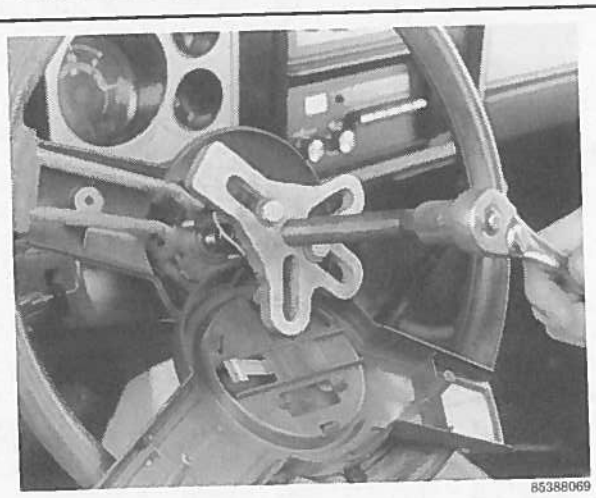


Fig. 63 Use a suitable threaded puller to loosen the steering wheel from the shaft

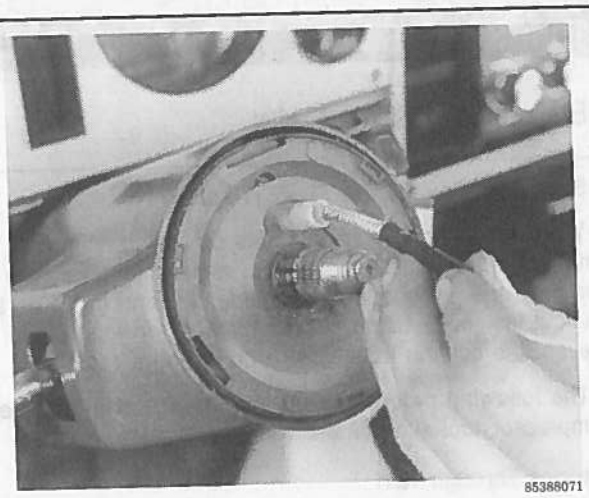


Fig. 66 When the wheel is removed, be careful not to loosen the horn spring (if equipped)

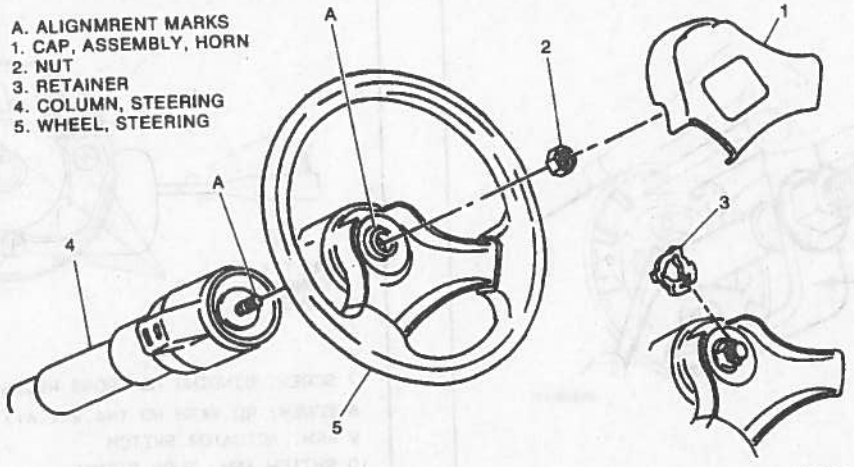


Fig. 64 Exploded view of a late model steering wheel mounting

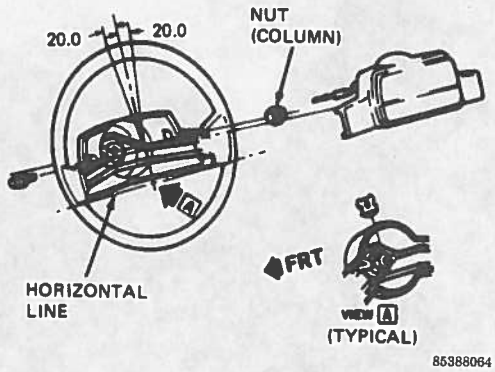


Fig. 67 Steering wheel alignment and installation

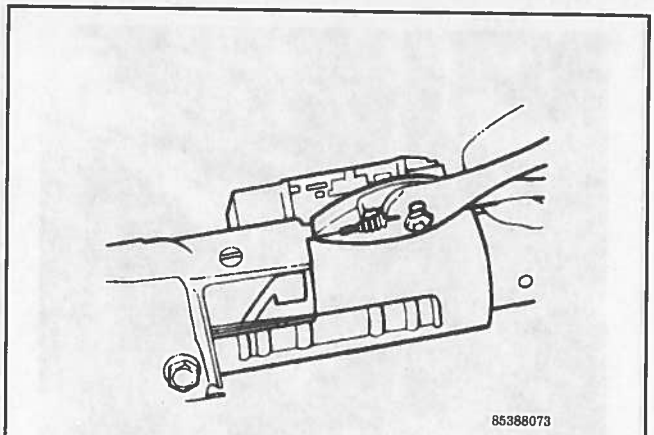


Fig. 69 Early model wiring protectors are removed by pulling downward on the tabs provided

Turn Signal Switch

REMOVAL & INSTALLATION

◗ See Figures 68, 69, 70, 71, 72, 73 and 74

➡When servicing any components on the steering column, should any fasteners require replacement, be sure to use only nuts and bolts of the same size and grade as the original fasteners. Using screws that are too long could prevent the column from collapsing during a collision.

➡The following procedures require the use of a lock plate compressor tool such as J-23653 or equivalent.

Vehicles Through 1991

1. Disconnect the negative battery cable.

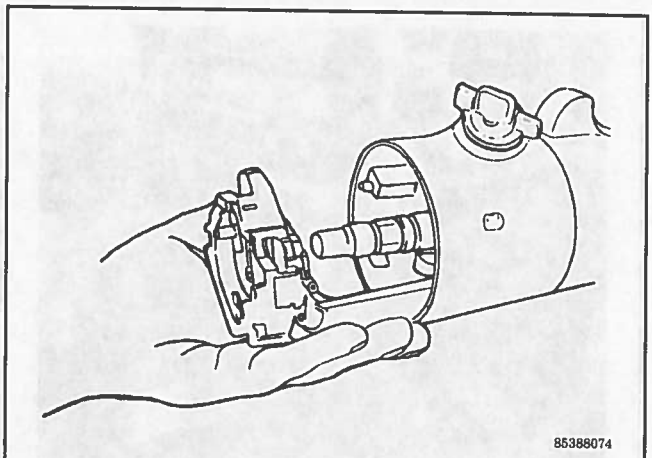


Fig. 70 Removing the turn signal from the steering column

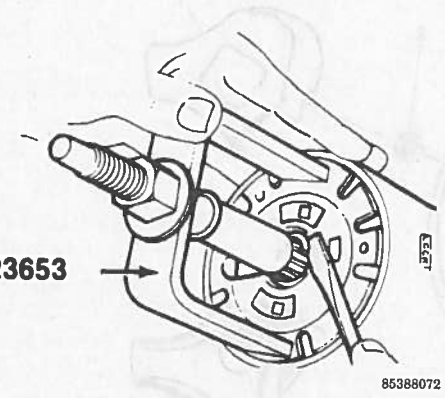


Fig. 68 Use a suitable lock plate compressor tool when removing the shaft lock

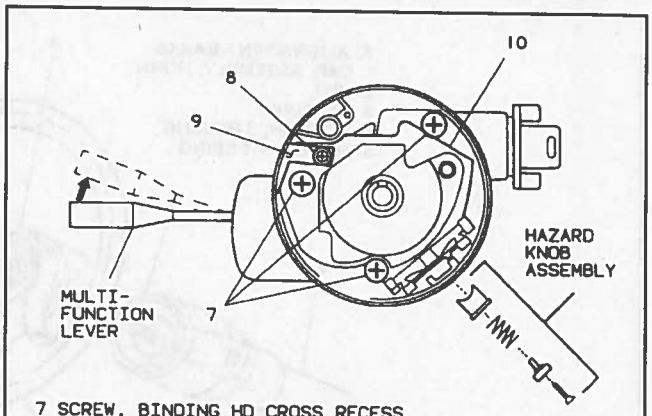
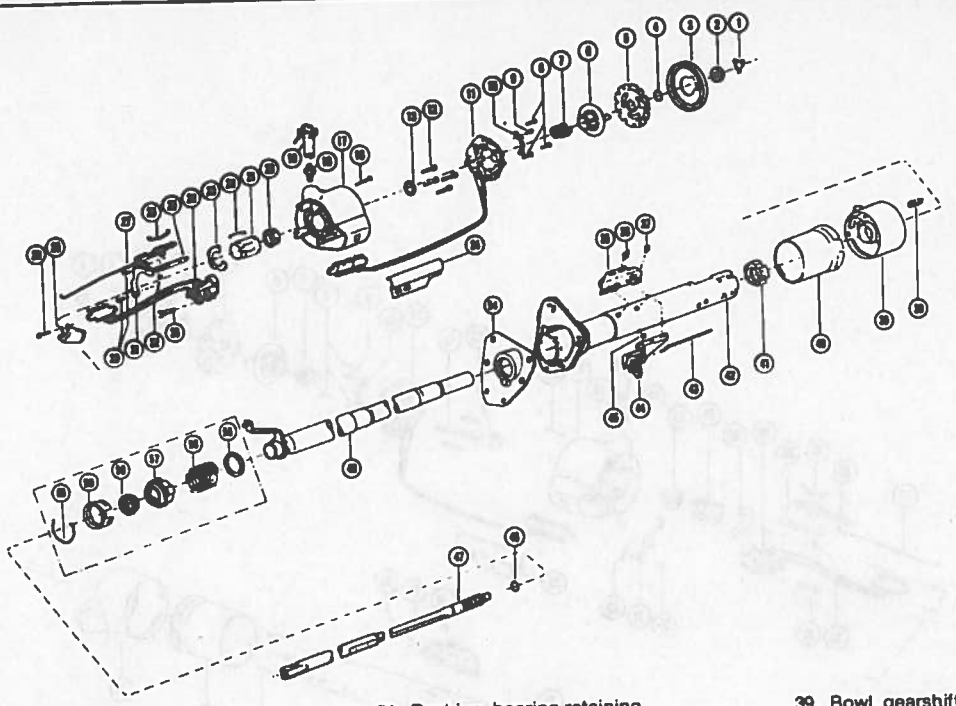


Fig. 71 Late model turn signal switch mounting



1. Retainer
2. Nut, hexagon
3. Cover, shaft lock
4. Ring, retaining
5. Lock, steering shaft
6. Cam assy, turn signal cancelling
7. Spring, upper bearing
8. Screw, binding head cross recess
9. Screw, round washer head
10. Arm assy, switch actuator
11. Switch assy, turn signal
12. Screw, hex washer head tapping
13. Washer, thrust
16. Screw, lock retaining
17. Housing, steering column
18. Sector assy, switch actuator
19. Lock cylinder set, steering column
20. Bearing assy
21. Bushing, bearing retaining
22. Contact, horn circuit
23. Retainer, upper bearing
24. Switch assy, pivot &
25. Bolt assy, spring &
26. Spring, rack preload
27. Rack assy, switch actuator rod &
28. Cover, housing
29. Screw, binding head cross recess
30. Screw, flat head cross recess
31. Gate, shift lever
32. Washer, spring thrust
33. Pin, switch actuator pivot
34. Protector, wiring
35. Switch assy, ignition
36. Stud, dimmer & ignition switch mounting
37. Screw, washer head
38. Spring, upper shift lever
39. Bowl, gearshift lever
40. Shroud, gearshift bowl
41. Bearing, bowl lower
42. Jacket assy, steering column
43. Rod, dimmer switch actuator
44. Switch assy, dimmer
45. Nut, hexagon
46. Ring, retaining
47. Shaft assy, steering
48. Tube assy, shift
54. Seal, dash
55. Washer spring thrust
56. Spring shift tube return
57. Adapter, lower bearing
58. Bearing assembly
59. Retainer bearing adapter
60. Clip, lower bearing adapter

85388076

Fig. 72 Exploded view of a common standard steering column

2. Matchmark and remove the steering wheel. Please refer to the procedure earlier in this section for details.

➡If necessary, the steering column may be removed for this service, but turn signal switch replacement should be possible with the column installed on most vehicles covered by this manual.

3. Insert a small prytool into the slots between the steering shaft lock plate cover and the steering column housing, then pry upward to remove the cover from the lock plate.

4. Position a lock plate compressor tool such as J-23653-A or equivalent, by screwing the tool's center shaft onto the steering shaft (as far as it will go), then screw the center post nut clockwise until the lock plate is compressed.

5. Pry the locking plate snapring from the steering shaft slot.

➡If the steering column is being disassembled on a bench, the steering shaft is free to slide out of the mast jacket when the snapring is removed.

6. Carefully release and remove the lock plate compressor tool, then remove the lock plate.

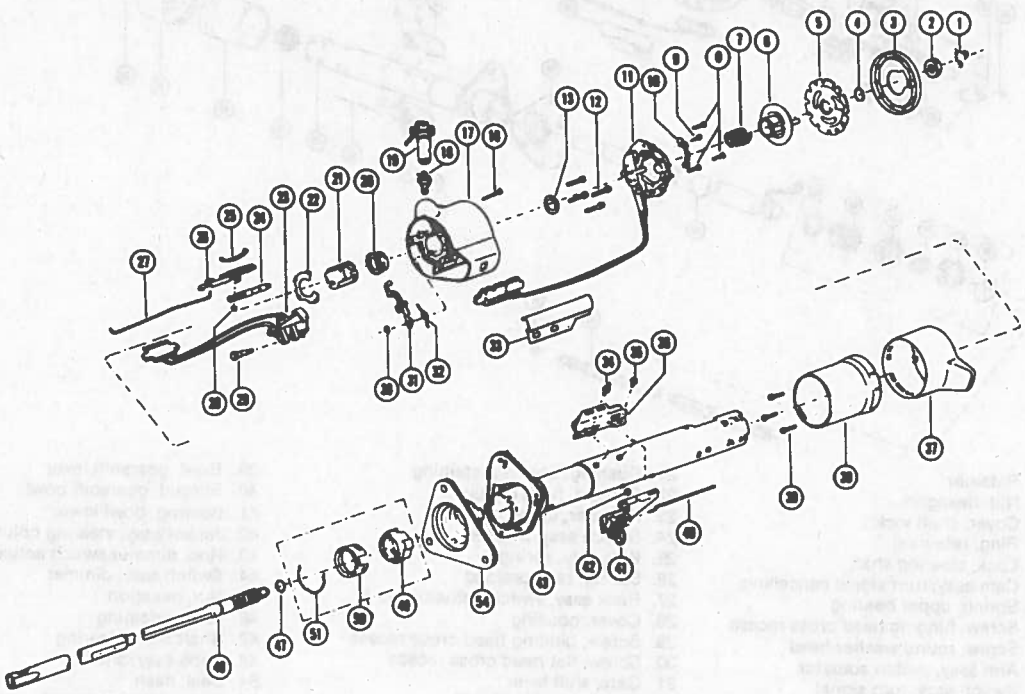
7. Loosen the retaining screw, then remove the turn signal lever.

8. Remove the hazard warning knob; press the knob inward and then unscrew it.

9. Remove the turn signal switch assembly-to-steering column retaining screws.

➡Whenever wiring and connectors must be pulled through the steering column, attach a length of mechanic's wire to the connector before beginning. Once the wiring and connector has been pulled through the column, leave the length of mechanic's wire in place (through the column) so it can be used to draw the connector back into position during installation.

10. Pull the switch connector out of the bracket on the jacket and feed the switch connector through the column support bracket. Pull the switch straight up, guiding the wiring harness through the column housing and protector.



1. Retainer
2. Nut, hexagon jam
3. Cover, shaft lock
4. Ring, retaining
5. Lock, steering shaft
6. Cam assy, turn signal cancelling
7. Spring, upper bearing
8. Screw, binding head cross recess
9. Screw, round washer head
10. Arm assy, switch actuator
11. Switch assy, turn signal
12. Screw, hex washer head tapping
13. Washer, thrust
16. Screw, lock retaining
17. Housing, steering column
18. Sector assy, switch actuator
19. Lock cylinder set, steering column
20. Bearing assy
21. Bushing, bearing retaining
22. Retainer, upper bearing
23. Switch assy, pivot &
24. Bolt assy, spring &
25. Spring, rack preload
26. Rack, switch actuator
27. Rod, switch actuator
28. Washer, spring thrust
29. Pin, switch actuator pivot
30. Washer, wave
31. Lever, key release
32. Spring, key release
33. Protector, wiring
34. Stud, dimmer and ignition switch mounting
35. Screw, washer head
36. Switch assy, ignition
37. Bowl, floor shift
38. Shroud, shift bowl
39. Screw, binding head cross recess
40. Rod, dimmer switch actuator
41. Switch assy, dimmer
42. Nut, hexagon
43. Jacket assy, steering column
47. Ring, retaining
48. Shaft assy, steering
49. Bushing assy. steering shaft
50. Retainer, bearing adapter
51. Clip, lower bearing adapter
54. Bracket assy, column dash

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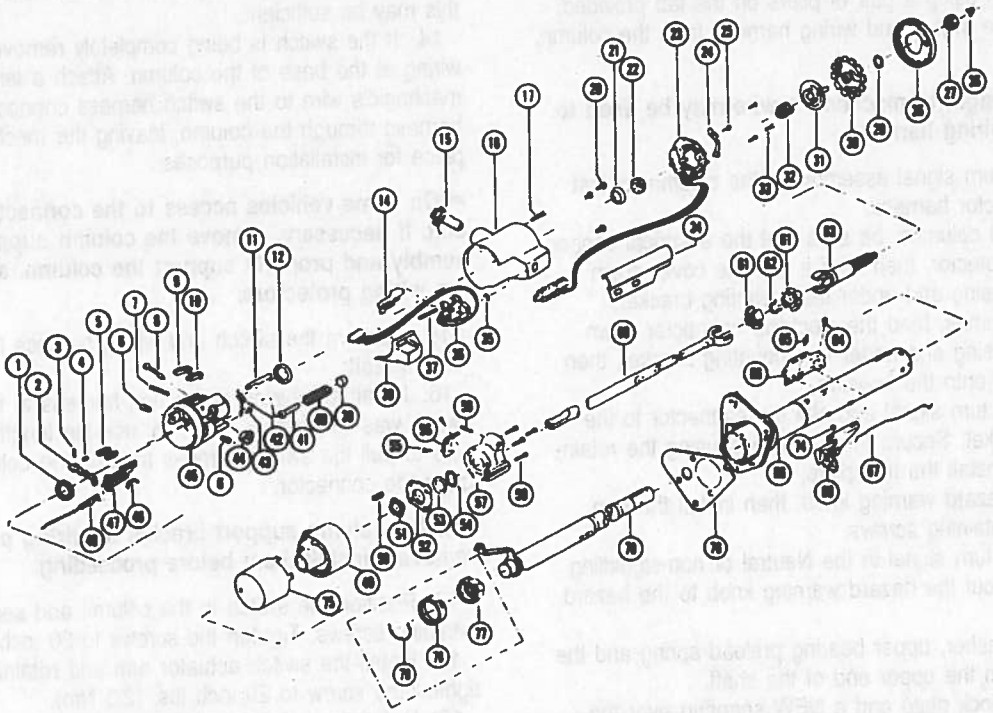
Fig. 73 Exploded view of a common key release standard column



1. Bearing assy
2. Lever, shoe release
3. Pin, release lever
4. Spring, release lever
5. Spring, shoe
6. Pin, pivot
7. Pin, dowel
8. Shaft, drive
9. Shoe, steering wheel lock
10. Shoe, steering wheel lock
11. Bolt, lock
12. Bearing assy
14. Actuator, dimmer switch rod
15. Lock cylinder set, strg column
16. Cover, lock housing
17. Screw, lock retaining
20. Screw, pan head cross recess
21. Race, inner
22. Seat, upper bearing inner race
23. Switch assy, turn signal
24. Arm assy, signal switch
25. Screw, round washer head
26. Retainer
27. Nut, hex jam
28. Cover, shaft lock
29. Ring, retaining
30. Lock, shaft
31. Cam assy, turn signal cancelling
32. Spring, upper bearing
33. Screw, binding head cross recess
34. Protector, wiring
35. Spring, pin preload
36. Switch assy, pivot &
37. Pin, switch actuator pivot
38. Cap, column housing cover end
39. Retainer, spring
40. Spring, wheel tilt
41. Guide, spring
42. Spring, lock bolt
43. Screw, hex washer head
44. Sector, switch actuator
45. Housing, steering column
46. Spring, rack preload
47. Rack, switch actuator
48. Actuator assy, ignition switch
49. Bowl, gearshift lever
50. Spring, shift lever
51. Washer, wave
52. Plate, lock
53. Washer, thrust
54. Ring, shift tube retaining
55. Screw, oval head cross recess
56. Gate, shift lever
57. Support, strg column housing
58. Screw, support
59. Pin, dowel
60. Shaft assy, lower steering
61. Sphere, centering
62. Spring, joint preload
63. Shaft assy, race & upper
64. Screw, washer head
65. Stud, dimmer & ignition switch mounting
66. Switch assy, ignition
67. Rod, dimmer switch
68. Switch assy, dimmer
69. Jacket assy, steering column
70. Tube assy, shift
74. Nut, hexagon
75. Shroud, gearshift bowl
76. Seal, dash
77. Bushing assy, steering shaft
78. Retainer, bearing adapter
79. Clip, lower bearing adapter

85388078

Fig. 74 Exploded view of a common tilt steering column

11. If equipped with a tilt column, position the housing in the "low" position.
12. Remove the wiring protector by pulling downward and out of the column using a pair of pliers on the tab provided.
13. Remove the switch and wiring harness from the column.

To install:

➡If used, the length of mechanic's wire may be used to help route the wiring harness.

14. Install the turn signal assembly to the column by first routing the connector harness:
    a. On non-tilt columns, be sure that the electrical connector is on the protector, then feed it and the cover down through the housing and under the mounting bracket.
    b. On tilt columns, feed the electrical connector down through the housing and under the mounting bracket, then install the cover onto the housing.
15. Position the turn signal and clip the connector to the bracket on the jacket. Secure the turn signal using the retaining screws, then install the trim plate.
16. Install the hazard warning knob, then install the turn signal lever and retaining screws.
17. Position the turn signal in the Neutral or non-signalling position, then pull out the hazard warning knob to the hazard On position.
18. Install the washer, upper bearing preload spring and the cancelling cam onto the upper end of the shaft.
19. Position the lock plate and a NEW snapring over the shaft, then position the compressor tool. Use the tool to compress the lock plate as far as it will go, then slide the new snapring down the shaft and into the groove. Carefully release the compressor tool and make sure the lock plate is properly positioned.
20. Snap the lock plate cover into position.
21. Align and install the steering wheel.
22. Make sure the ignition is **OFF**, then connect the negative battery cable.

1992-93 Vehicles

1. Disconnect the negative battery cable.
2. Matchmark and remove the steering wheel. Please refer to the procedure earlier in this section for details.
3. Remove the shaft lock cover.
4. Push downward on the shaft lock assembly until the snapring is exposed using the shaft lock compressor tool.
5. Remove the shaft lock retaining snapring, then carefully release the tool and remove the shaft lock from the column.
6. Remove the turn signal cancelling cam assembly.
7. For standard columns, remove the upper bearing spring and thrust washer.
8. For tilt columns, remove the upper bearing spring, inner race seat and inner race.
9. Move the turn signal lever upward to the "Right Turn" position.
10. Remove the access cap and disengage the multi-function lever harness connector, then grasp the lever and pull it from the column.
11. Loosen and remove the hazard knob retaining screw, then remove the screw, button, spring and knob.
12. Remove the screw and the switch actuator arm.
13. Remove the turn signal switch retaining screws, then pull the switch forward and allow it to hang from the wires. If the switch is only being removed for access to other components, this may be sufficient.
14. If the switch is being completely removed, disengage the wiring at the base of the column. Attach a length of mechanic's wire to the switch harness connector, then pull the harness through the column, leaving the mechanic's wire in place for installation purposes.

➡On some vehicles access to the connector may be difficult. If necessary, remove the column support bracket assembly and properly support the column, and/or remove the wiring protectors.

15. Remove the switch and wiring harness from the vehicle.

To install:

16. Install the switch and wiring harness to the vehicle. If the switch was completely removed, use the length of mechanic's wire to pull the switch harness through the column, then engage the connector.

➡If the column support bracket or wiring protectors were removed, install them before proceeding.

17. Position the switch in the column and secure using the retaining screws. Tighten the screws to 30 inch lbs. (3.4 Nm).
18. Install the switch actuator arm and retaining screw, then tighten the screw to 20 inch lbs. (2.3 Nm).
19. Install the hazard knob assembly, then install the multi-function lever.
20. Install the thrust washer and upper bearing spring (standard columns) or the inner race, upper bearing race seat and upper bearing spring (tilt columns), as applicable.
21. Lubricate the turn signal cancelling cam using a suitable synthetic grease (usually included in the service kit), then install the cam assembly.
22. Position the shaft lock and a NEW snapring, then use the lock compressor to hold the lock down while you seat the new snapring. Make sure the ring is firmly seated in the groove, then carefully release the tool.
23. Install the shaft lock cover.
24. Align and install the steering wheel.
25. Make sure the ignition is **OFF**, then connect the negative battery cable.

Ignition Switch

For anti-theft reasons, the ignition switch is located on top of the steering column assembly and is completely inaccessible without first lowering the steering column. The switch is actuated by a rod and rack assembly. A gear on the end of the lock cylinder engages the toothed upper end of the actuator rod.

REMOVAL & INSTALLATION

◗ See Figure 75

1. Disconnect the negative battery cable.
2. Remove the lower column trim panel, then remove the steering column-to-instrument panel fasteners and carefully lower the column for access to the switch.

3. Place the ignition switch in the **OFF-LOCK** position.

➡If the lock cylinder was removed on vehicles through 1991, the actuating rod should be pulled up until it stops, then moved down one detent; the switch is now in the Lock position.

4. Remove the ignition switch-to-steering column retainers, then remove the assembly.

To install:

5. Before installing the ignition switch, place it in the **OFF-LOCK** position, then make sure that the lock cylinder and actuating rod are in the Locked position (1st detent from the top or 1st detent to the right of far left detent travel).

➡Most replacement switches are pinned in the OFF-LOCK position for installation purposes. If so, the pin MUST be removed after installation or damage may occur.

6. Install the activating rod into the ignition switch and assemble the switch onto the steering column. Once the switch is properly positioned, tighten the ignition switch-to-steering column retainers to 35 inch lbs. (4.0 Nm).

➡When installing the ignition switch, use only the specified screws since over length screws could impair the collapsibility of the column.

7. Raise the column into position and secure, then install any necessary trim plates.
8. Make sure the ignition is **OFF**, then connect the negative battery cable.

Headlight Dimmer Switch

The headlight dimmer switch is mounted on top of the steering column with the ignition switch. In some cases, these 2 switches may even share retainers, requiring the partial removal of the ignition switch in order to remove the dimmer switch. The switch locations makes replacement unlikely without first lowering the steering column. The switch is actuated by the multi-function lever through a rod.

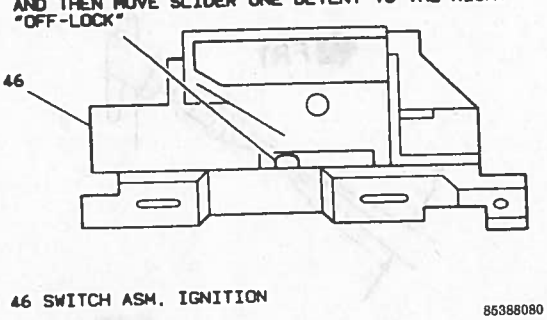

MOVE SWITCH SLIDER TO EXTREME LEFT POSITION AND THEN MOVE SLIDER ONE DETENT TO THE RIGHT "OFF-LOCK"
46
46 SWITCH ASM. IGNITION
85388080

Fig. 75 Adjusting the ignition switch

REMOVAL & INSTALLATION

See Figure 76

1. Disconnect the negative battery cable.
2. Remove the lower column trim panel, then remove the steering column-to-instrument panel fasteners and carefully lower the column for access to the switch.

➡If the ignition switch shares fasteners with the dimmer switch it may be necessary to remove it first. For details, please refer to the procedure located earlier in this section.

3. Remove the dimmer switch-to-steering column retainers, then remove the switch from the column.

To install:

4. Position the switch to the column and loosely install the retainers.
5. Insert a 3/32 in. drill bit into the adjustment hole provided in the switch to limit travel, then push the switch up against the actuator rod in order to remove lash.
6. Tighten the switch retainers, then remove the drill bit.
7. If removed for access, install the ignition switch.
8. Raise the column into position and secure, then install any necessary trim plates.
9. Make sure the ignition is **OFF**, then connect the negative battery cable.

Ignition Lock Cylinder

REMOVAL & INSTALLATION

See Figure 77

1. Disconnect the negative battery cable.
2. Matchmark and remove the steering wheel.
3. Remove the turn signal switch from the column and allow it to hang from the wires (leaving them connected). For details, please refer to the procedure located earlier in this section.

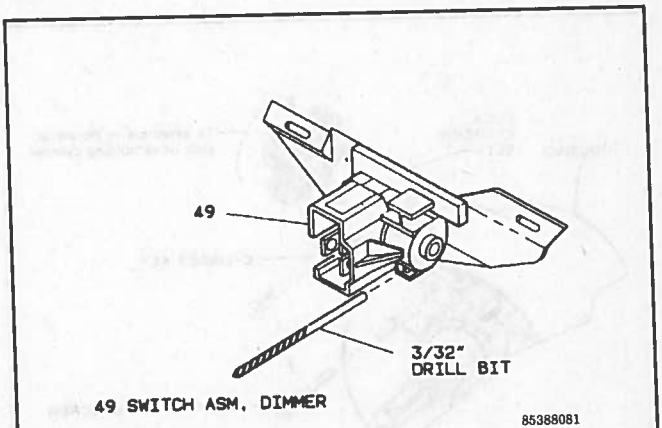


Fig. 76 Adjusting the dimmer switch using a 3/32 in drill bit

4. For vehicles through 1991, place the lock cylinder in the **Run** position.
5. For 1992-93 vehicles, remove the buzzer switch assembly.
6. Carefully remove the lock cylinder screw and the lock cylinder. If possible, use a magnetic tipped screwdriver on the screw in order to help prevent the possibility of dropping it.

⁂CAUTION

If the screw is dropped upon removal, it could fall into the steering column, requiring complete disassembly in order to retrieve the screw and prevent damage.

To install:

7. Align and install the lock cylinder set. On vehicles through 1991 it will be necessary to rotate the switch clockwise to align the cylinder key with the keyway in the housing.
8. Push the lock cylinder all the way in, then carefully install the retaining screw. Tighten the screw to 22 inch lbs. (2.5 Nm) on tilt columns or to 40 inch lbs. (4.5 Nm) on standard non-tilt columns.
9. If necessary, install the buzzer switch assembly.
10. Reposition and secure the turn signal switch assembly
11. Align and install the steering wheel.
12. Make sure the ignition is **OFF**, then connect the negative battery cable.

Steering Column

REMOVAL & INSTALLATION

See Figures 78 and 79

1. Disconnect the negative battery cable.
2. Matchmark the relationship of the upper pot joint to the steering shaft, then remove the nut/bolt and separate the joint from the shaft.
3. If equipped with a column mounted shifter, disconnect the transmission control linkage from the column shift tube levers.

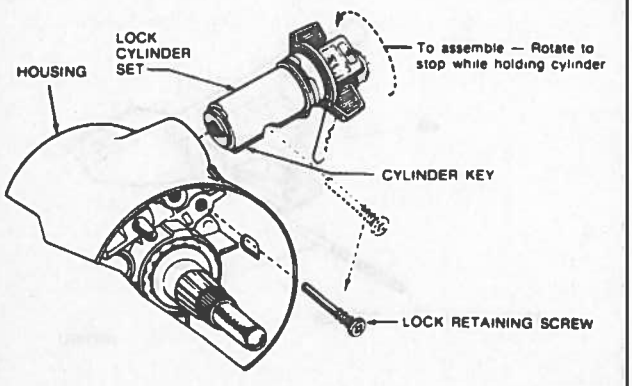
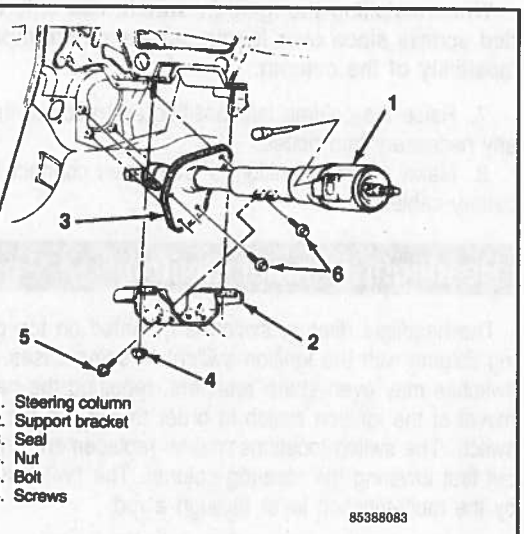


Fig. 77 Ignition cylinder replacement

4. If equipped, remove the lower steering column trim panel.
5. If applicable, disconnect the shift indicator cable from the shift bowl.
6. If necessary, remove the steering wheel.
7. Remove the bolts from the column floor/toe plate.
8. Remove the column support bracket-to-instrument panel retainers, then carefully lower the column for access to the wiring.
9. Disengage all of the electrical connectors from the steering column assembly.

➡Once the steering column has been removed from the vehicle, be careful not to drop it (especially on it's end), lean on it or damage it in any way; the column is very susceptible to damage.

10. Remove the column from the vehicle. Rotate the column so the shift lever clears the cowl opening.



1. Steering column
2. Support bracket
3. Seal
4. Nut
5. Bolt
6. Screws

Fig. 78 Common steering column mounting

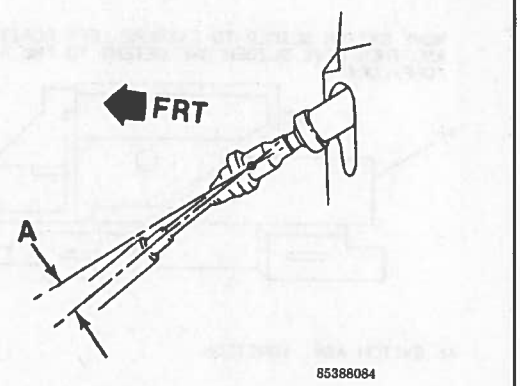


Fig. 79 The upper pot joint operating angle MUST not exceed 12.5 degrees

To install:

11. Position the steering column in the vehicle while carefully guiding the lower end through the cowl.
12. Engage the electrical wiring connectors to the column.
13. Raise the column into position and connect the shift indicator cable to the bowl (if equipped) then loosely install the column bracket-to-instrument panel retainers.
14. Loosely install the column floor/toe plate retainers.
15. Align and connect the pot joint to the steering shaft. Check the pot joint operating angle, it MUST no exceed 12.5 degrees. Install the nut/bolt and tighten to 26 ft. lbs. (35 Nm) for vehicles through 1992 or to 45 ft. lbs. (62 Nm) for 1993 vehicles.
16. Tighten the column retainers. The floor/toe retainers should be tightened to 120 inch lbs. (13 Nm), the column bracket-to-column bolts (if removed) to 17 ft. lbs. (22 Nm) and the column bracket-to-instrument panel retainers to 22 ft. lbs. (30 Nm).
17. If equipped with a column mounted shifter, connect the transmission control linkage to the column shift tube levers, then check and adjust the shift indicator cable, as necessary.
18. If removed, align and install the steering wheel.
19. If applicable, install the steering column trim panel.
20. Make sure the ignition is **OFF**, then connect the negative battery cable.

Steering Linkage

See Figures 80 and 81

The steering linkage consists of: a forward mounted linkage, crimp or prevailing torque nuts at the inner pivots, castellated nuts at the steering knuckle arm, an idler arm, a steering gear pitman arm, a relay rod and a steering damper (4wd vehicles). Grease fittings are equipped with each joint, for durability. Depending on the application, the relay rod may only be equipped with holes to accept ball studs, or the rod may itself contain ball studs for connection with the pitman/idler arms.

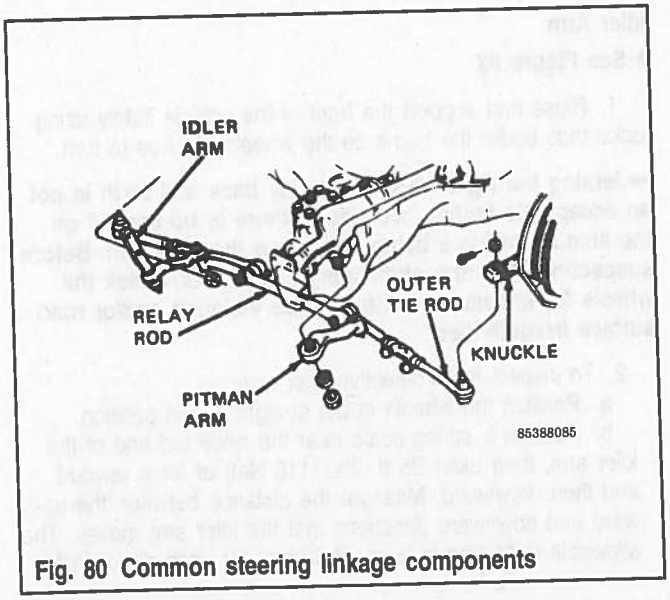


Fig. 80 Common steering linkage components

REMOVAL & INSTALLATION

Pitman Arm

See Figure 82

1. Raise and support the front of the vehicle safely using jackstands.
2. For 1991-93 vehicles:
   a. If necessary, remove the air snorkle for access to the intermediate shaft.
   b. Matchmark the upper and lower intermediate shaft joints, then remove the retainers and remove the intermediate shaft.
   c. Disconnect the oil cooler pipes at the crossmember.
   d. If equipped, remove the splash shield.
3. Remove the nut from ball stud at the relay rod-to-pitman arm connection.
4. Using a suitable universal steering linkage puller, such as J-24319-01 or equivalent, separate the relay rod from the pitman arm. Pull down on the relay rod and separate the stud.
5. For 1991-93 vehicles where access to the pitman arm/nut is restricted, remove the 2 lower steering gear bolts (leaving on the top bolt which should be loosened), then pivot the steering gear for pitman arm clearance at the frame crossmember. Support the gear using a block of wood.
6. Remove the pitman arm-to-pitman shaft nut, then matchmark the relationship of the arm to the shaft to assure proper alignment during assembly.
7. Using a pitman arm remover such as J-6632 or equivalent, separate the pitman arm from the pitman shaft and remove it from the vehicle.

➡When separating the pitman arm from the shaft, DO NOT use a hammer or apply heat to the arm.

To install:

➡If the pitman arm is being replaced, transfer the alignment mark to the new component.

8. Install the pitman arm while aligning the arm-to-pitman shaft matchmark. Use a steering linkage installer such as J-29193 (12mm), J-29194 (14mm) or equivalent (as applicable) to properly seat the arm on the shaft, install the correct one onto the shaft and torque it to 40 ft. lbs. (54 Nm) to seat the taper.
9. Remove the installer tool, then install the pitman shaft nut and tighten to 185 ft. lbs. (250 Nm).
10. On 1991-93 vehicles on which the gear was pivoted for access, pivot the gear back into position and install the lower retaining bolts. Tighten all of the retaining bolts to 55 ft. lbs. (75 Nm).
11. Connect the pitman arm to the relay rod (make sure that the seal is on the stud). Use a steering linkage installer such as J-29193 (12mm), J-29194 (14mm) or equivalent (as applicable), install the correct one onto the ball stud and torque it to 40 ft. lbs. (54 Nm) to seat the taper.
12. After seating, remove the tool, install the lock washer and nut and torque to 60 ft. lbs. (82 Nm). If a prevailing torque nut was used a NEW nut MUST be installed.
13. On 1991-93 vehicles install the splash shield, oil cooler pipes, intermediate shaft and air duct, as applicable.
14. Remove the jackstands and carefully lower the vehicle.

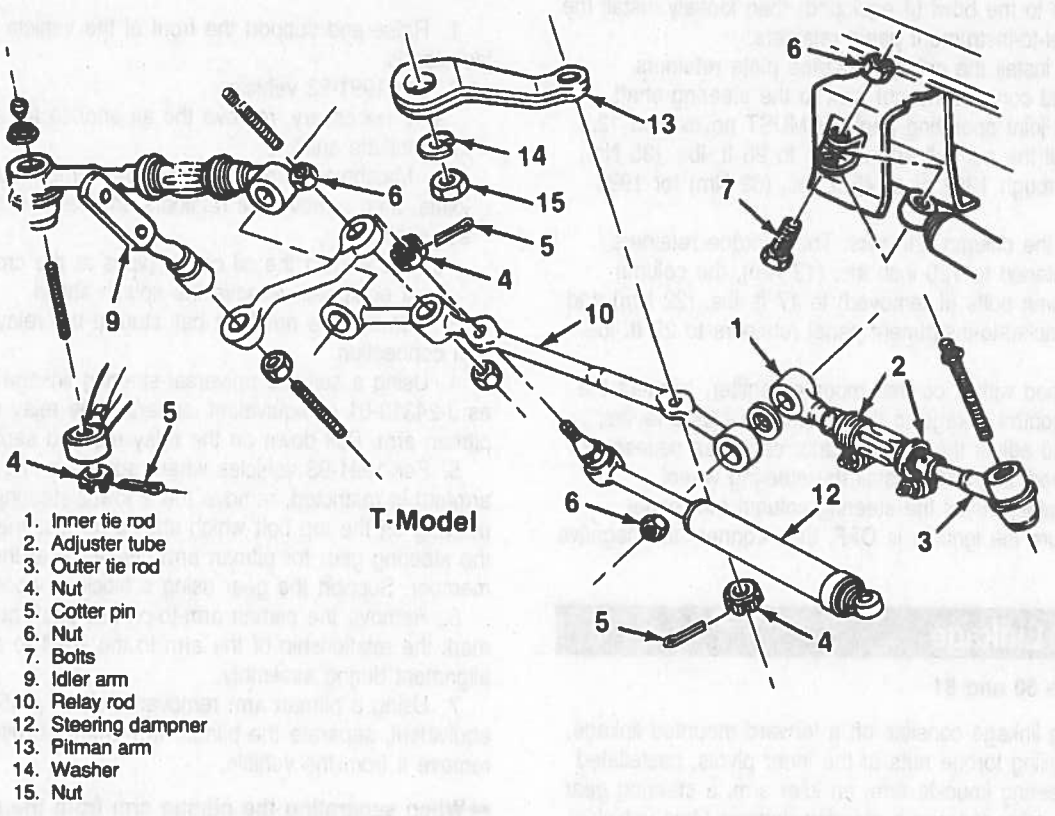


Fig. 81 Common 4wd steering linkage components (with steering damper)

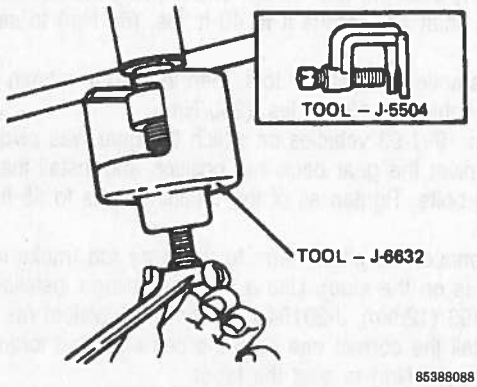


Fig. 82 Remove the pitman arm using a suitable pitman puller tool

15. Check and adjust toe, as necessary.

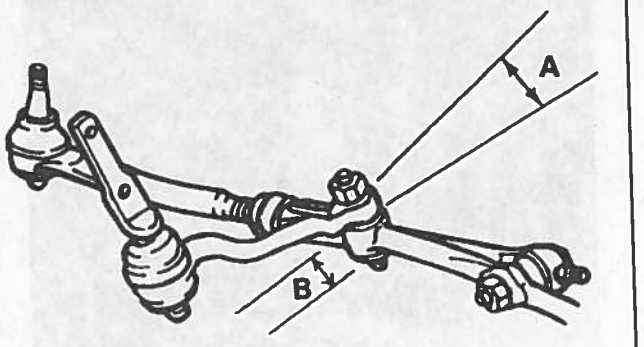
Idler Arm

See Figure 83

1. Raise and support the front of the vehicle safely using jackstands under the frame so the wheels are free to turn.

Jerking the right wheel assembly back and forth is not an acceptable testing procedure; there is no control on the amount of force being applied to the idler arm. Before suspecting idler arm shimmying complaints, check the wheels for imbalance, runout, force variation and/or road surface irregularities.

2. To inspect for a defective idler arm:
   a. Position the wheels in the straight ahead position.
   b. Position a spring scale near the relay rod end of the idler arm, then exert 25 ft. lbs. (110 Nm) of force upward and then downward. Measure the distance between the upward and downward directions that the idler arm moves. The allowable deflection is 1/8 in. (3.18mm) for each direction for



A. 3.175 mm (1/8-inch)
B. Apply SpringScale

Fig. 83 Checking the idler arm for wear or damage

a total difference of 1/4 in. (6.35mm); if the idler arm deflection is beyond the allowable limits, replace it.

3. Remove the idler arm-to-frame bolts/nuts.
4. Remove the nut from the idler arm-to-relay rod ball joint.
5. Use a suitable steering linkage puller such as J-24319-01 or equivalent to separate the relay rod from idler arm.
6. Remove the idler arm assembly from the vehicle.

To install:

7. Install the idler arm, then tighten the arm assembly-to-frame bolts to 60 ft. lbs. (82 Nm).
8. Connect the relay rod to the idler arm. Use a steering linkage installer such as J-29193 (12mm), J-29194 (14mm) or equivalent (as applicable) to seat the relay rod-to-idler arm ball joint stud. Tighten the tool to 40 ft. lbs. (54 Nm), then remove the tool.
9. Install the idler arm-to-relay rod stud nut and torque it to 35 ft. lbs. (47 Nm) for 2wd vehicles or 60 ft. lbs. (81 Nm) for 4wd vehicles.
10. Remove the jackstands and carefully lower the vehicle.
11. Check and/or adjust the toe-in, as necessary.

Relay Rod (Centerlink)

1. Raise and support the vehicle safely using jackstands.
2. Remove the inner tie rod stud nuts, then separate the tie rods from the relay rod using a suitable linkage puller. For details, please refer to the tie rod procedure located later in this section.
3. On vehicles equipped with a steering damper, remove the shock absorber ball stud nut, then separate the shock from the relay rod using a suitable linkage puller, such as J-24319-01 or equivalent.
4. Remove the ball stud nut from the pitman arm-to-relay rod connection, then use a suitable steering linkage puller, such as J-24319-01 or equivalent, to disconnect the pitman rod from the idler arm.
5. Remove the ball stud nut from the idler arm-to-relay rod connection, then use a suitable steering linkage puller, such as J-24319-01 or equivalent, to disconnect the relay rod from the idler arm.
6. Once the linkage components have been removed from the relay rod, it is free to be removed from the vehicle.

To install:

7. Clean and inspect the threads on the tie rod, the tie rod ends and the ball joints for damage, and replace them (if necessary). Inspect the ball joint seals for excessive wear, and replace them (if necessary).
8. Connect the relay rod to the idler arm. Use a steering linkage installer such as J-29193 (12mm), J-29194 (14mm) or equivalent (as applicable) to seat the relay rod-to-idler arm ball joint stud. Tighten the tool to 40 ft. lbs. (54 Nm), then remove the tool.
9. Install the idler arm-to-relay rod stud nut and torque it to 35 ft. lbs. (2wd) or 60 ft. lbs. (4wd).
10. Connect the pitman arm to the relay rod (make sure that the seal is on the stud). Use a steering linkage installer such as J-29193 (12mm), J-29194 (14mm) or equivalent (as applicable), install the correct one onto the ball stud and torque it to 40 ft. lbs. (54 Nm) to seat the taper.
11. After seating, remove the tool, install the lock washer and nut and torque to 60 ft. lbs. (82 Nm). If a prevailing torque nut was used, a NEW nut MUST be installed.
12. Install the inner tie rods to the relay rod, then install the mounting nuts and tighten to specification. For details, please refer to the tie rod procedure located later in this section.
13. Remove the jackstands and carefully lower the vehicle, then check the steering linkage for proper operation.

Tie Rod

◗ See Figures 84, 85, 86, 87, 88, 89 and 90

➦The following procedure may be used to remove the entire tie rod assembly. If only one tie rod end of an assembly is being replaced, the entire assembly does not have to be removed from the vehicle. The opposite tie rod end (the end not being replaced) may remain attached to the steering linkage/knuckle, as applicable.

1. Raise and support the front frame of the vehicle safely using jackstands.
2. Remove the cotter pin from the tie rod-to-steering knuckle stud, then loosen and remove the retaining nut.
3. Remove the nut from the tie rod-to-relay rod connection.

➦DO NOT attempt to separate the tie rod-to-steering knuckle joint by driving a wedge type tool between the joint and knuckle or seal damage could result.

4. Using a suitable tie rod remover such as the wheel stud/tie rod tool No. J-6627-A or equivalent, separate the outer tie rod stud from the steering knuckle and the inner tie from the relay rod.
5. Remove the tie rod from the vehicle.
6. If one or both of the tie rod ends are being replaced:

➦Tie rod adjustment components tend to rust in service. If the torque required to remove the nut from the bolt exceeds 62 inch lbs. (9 Nm), the nuts should be replaced. Also, the components should be lubricated with a penetrating oil, then the clamps should be rotated until the move freely. Pay attention to the clamp positioning before loosening or removing them.

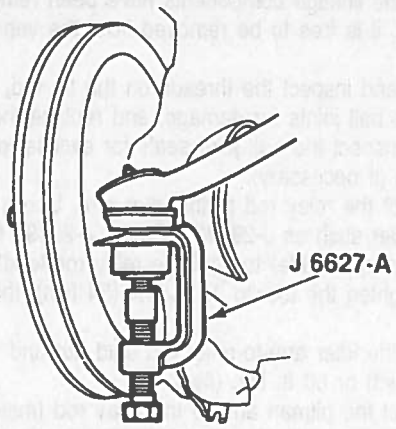


Fig. 84 A proper tools such as the wheel stud remover/tie rod separator tool should be used to free the tie rod ends

a. Measure the installed length of the tie rod end(s) for installation purposes.

b. Loosen the adjuster tube clamp bolt(s).

c. Unscrew the tie rod end from the adjuster tube; count the number of turns necessary to remove the tie rod end. This can be used to help preserve the toe adjustment during installation.

To install:

7. If one or both of the tie rod ends were removed:

a. Clean, inspect and lubricate the adjuster tube threads.

b. Thread the tie rod end into the adjuster tube using the same number of turns necessary to remove it. Once installed, measure the length of the tie rod end, as done during removal to help assure toe adjustment.

c. Position the clamp bolts between the adjuster tube dimples (located at each end) and in the proper location. Torque the adjuster tube clamp bolt 14 ft. lbs. (19 Nm).

8. Position the tie rod ends to the steering knuckle and/or the relay rod. Use a steering linkage installer such as J-29193 (12mm), J-29194 (14mm) or equivalent (as applicable), install the correct one onto the ball stud and torque it to 40 ft. lbs. (54 Nm) to seat the taper(s).

9. Once the ends are properly seated, remove the tool and install the retaining nut(s).

10. Tighten the inner and/or outer tie rod end retaining nuts to 35 ft. lbs. (47 Nm).

11. Install a new cotter pin to the castle nut(s), as applicable.

12. Check and adjust the toe, as necessary.

13. Remove the jackstands and carefully lower the vehicle, then check the steering linkage for proper operation.

Damper Assembly

See Figure 91

The damper assembly is used to remove steering wheel vibration and vehicle wander; not all vehicles are equipped with it, though most 4wd vehicles should come with a damper assembly.

1. Raise and support the front frame of the vehicle safely using jackstands.

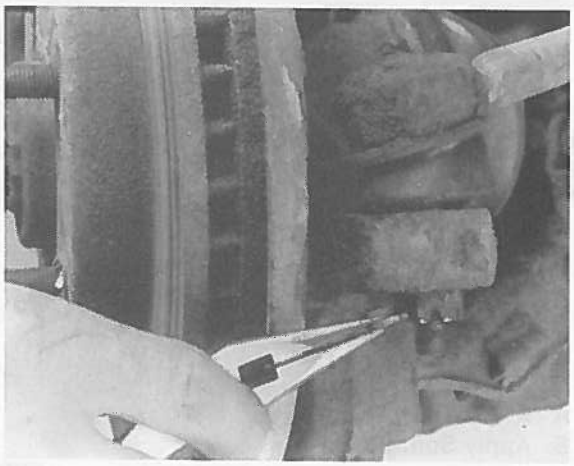


Fig. 85 When removing a tie rod end, first straighten the ends of the old cotter pin

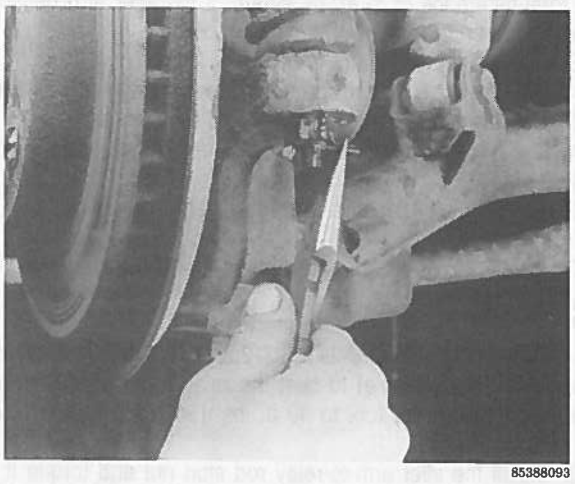


Fig. 86 Then pull the cotter pin from the ball stud and retaining nut

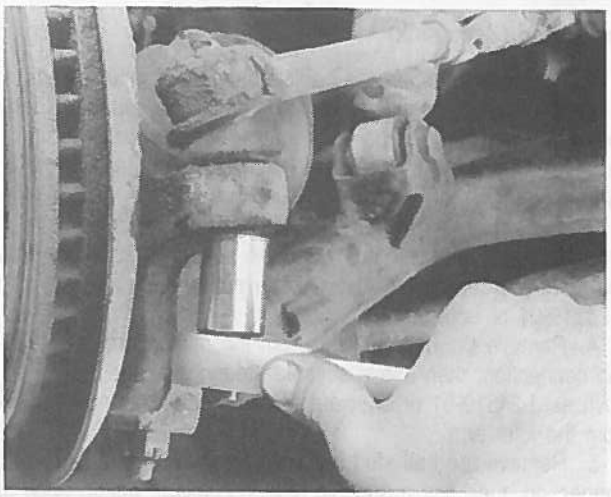


Fig. 87 Loosen and remove the stud nut

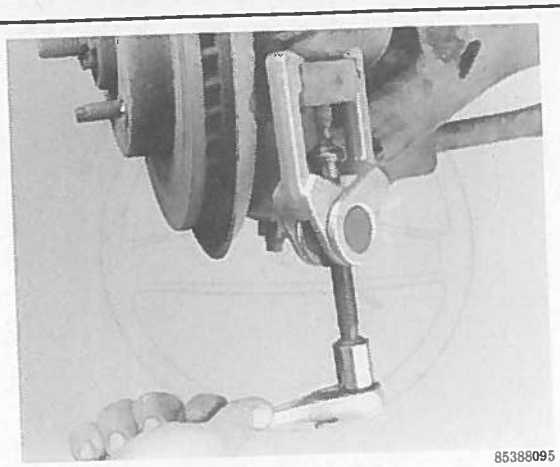


Fig. 88 Use a suitable puller to push the tie rod end free. DO NOT drive a wedge-type tool between the linkage

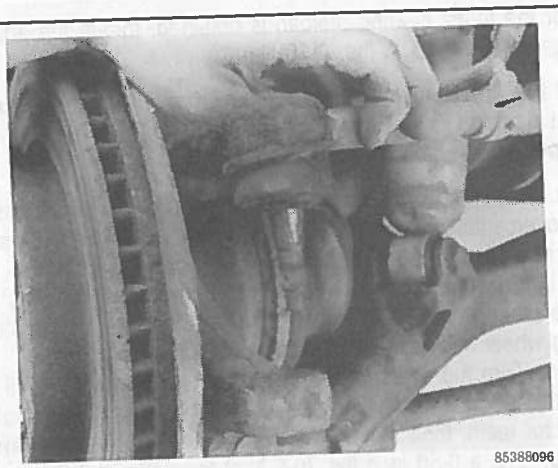


Fig. 89 Once the ball stud has be unseated, withdraw the tie rod end from the component (knuckle or relay rod, as applicable)

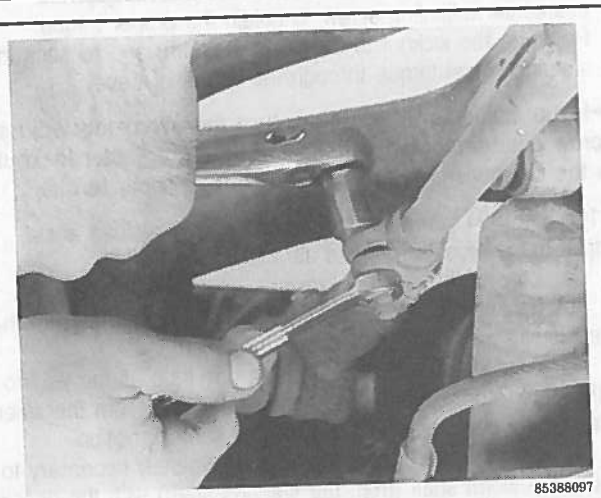


Fig. 90 If replacing a tie rod end (in this case still on the vehicle), loosen the adjuster clamp bolt/nut

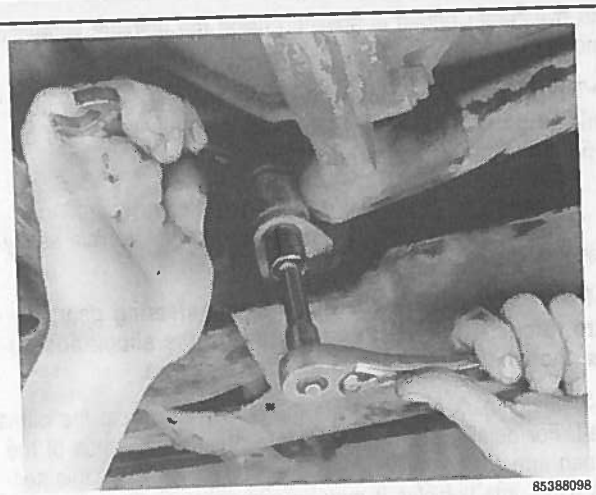


Fig. 91 Disconnecting the damper assembly from the frame bracket

2. Remove the damper assembly-to-relay rod cotter pin and nut.
3. Use a suitable universal steering linkage puller such as J-24319-01 or equivalent to separate the damper assembly from the relay rod.
4. Remove the cotter pin (if equipped) and the damper assembly-to-frame bracket nut/bolt, then remove the damper assembly from the vehicle.

To install:

5. Install the damper assembly to the frame bracket, then secure using the retainers. Tighten the bolt/nut to 26 ft. lbs. (35 Nm). If equipped, install a new cotter pin.
6. Position the damper assembly to the relay rod. Use a steering linkage installer such as J-29193 (12mm), J-29194 (14mm) or equivalent (as applicable), install the correct one onto the stud and torque it to 40 ft. lbs. (54 Nm) to seat the taper.
7. Remove the installation tool, then install retaining nut and tighten to 45 ft. lbs. (62 Nm). Install a new cotter pin.
8. Remove the jackstands and carefully lower the vehicle.

Manual Steering Gear

The recirculating ball type manual steering gear found on most of vehicles covered by this manual is manufactured by Saginaw and is equipped with a mechanical ratio of 24:1.

ADJUSTMENTS

See Figures 92, 93 and 94

Steering gear adjustments are made only as corrections and NOT as periodic adjustments. Before adjusting the gear, check the remainder of the steering linkage and front suspension for wear or damage and repair/replace components, as necessary. Adjustment takes place in 2 major steps. First the worm bearing preload adjustment is made using the adjuster plug, then

the overcenter prload is adjusted using the adjuster screw/bolt and jam nut.

➡The following procedure requires the use a steering linkage puller tool such as J-6632 or equivalent, and a 0-50 inch lbs. torque wrench.

1. Disconnect the negative battery cable.
2. Raise and support the front frame of the vehicle safely using jackstands.

➡Before adjustments are made to the steering gear, be sure to check the front end alignment, the shock absorbers, the wheel balance and the tire pressure.

3. Matchmark and separate the pitman arm from the pitman shaft. For details, please refer to the appropriate steps of the pitman arm replacement procedure located earlier in this section. On some vehicles it may be necessary to pivot the gear for access to the pitman arm, if so either temporarily reinstall the gear once the arm is removed, or remove the gear completely from the vehicle and adjust while measuring preload directly at the gear's input shaft.
4. Loosen the locknut for the steering gear adjuster plug, then back-off the adjuster plug ¼ turn.
5. Remove the horn cap or cover from the steering wheel for access to the shaft nut.
6. Gently, turn the steering wheel (in one direction) to the stop; then, turn it back ½ turn.

➡When the steering linkage is disconnected from the steering gear, DO NOT turn the steering wheel hard against the stops or damage to the ball guides may result.

7. Position a 0-50 inch lbs. (0-6 Nm) torque wrench onto the steering wheel nut, then measure and record the bearing drag. To measure the bearing drag, use the torque wrench to rotate the steering wheel 90°.
8. Have an assistant tighten the adjuster plug slowly as the steering wheel is being turned using the torque wrench. The plug should be tightened to a point where the torque wrench shows a worm bearing preload of 5-8 inch lbs. (0.6-1.0 Nm).

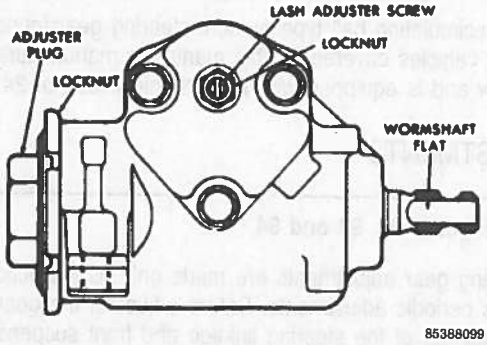


Fig. 92 Manual steering gear adjustment

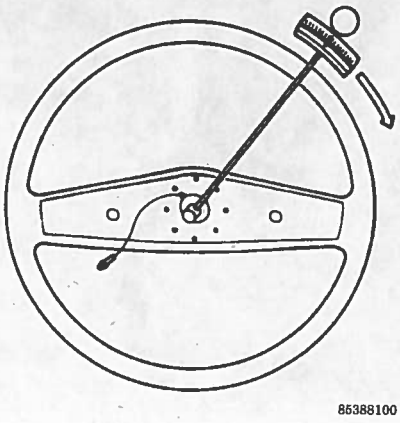


Fig. 93 Use an inch lbs. torque wrench to measure preload (effort necessary to turn the steering wheel/shaft)

After the thrust bearing preload is obtained, torque the adjuster plug locknut to 85 ft. lbs. (115 Nm).

➡If the steering gear feels lumpy (after adjustment), suspect damage to the bearings, probably due to the improper adjustment or severe impact.

9. After the worm bearing pre-load is properly set, adjust the overcenter preload on vehicles through 1993 as follows:
   a. Loosen the adjuster screw/bolt jam nut.
   b. Turn the steering wheel, from one stop all the way to the other stop, counting the number of turns. Turn the steering wheel back exactly ½ way to the center position.
   c. Turn the overcenter adjusting screw clockwise, until the lash is removed between the ball nut and the pitman shaft sector teeth, then tighten the locknut to 22 ft. lbs. (30 Nm).
   d. Use a 0-50 inch lbs. (0-6 Nm) torque wrench to check the highest force necessary to turn the steering wheel through the center position. Proper adjustment will yield a preload of 4-10 inch lbs. (0.5-1.2 Nm) over center.
   e. If necessary, loosen the locknut and readjust the overcenter adjusting screw to obtain the proper torque. Retorque the locknut to 22 ft. lbs. (30 Nm) and recheck the steering wheel torque through the center of travel.

➡If the maximum is too high, turn the overcenter adjuster screw counterclockwise, then torque the adjuster locknut in the clockwise motion to achieve the proper torque.

10. For 1994 vehicles, after worm bearing preload is set, adjust the overcenter preload as follows:
   a. Loosen the adjuster jam nut.
   b. Back off the adjuster screw until it stops, then turn the adjuster screw back inward one full turn.
   c. Turn the steering wheel, from one stop all the way to the other stop, counting the number of turns. Turn the steering wheel back exactly ½ way to the center position.
   d. Measure and record the torque (preload) necessary to turn the worm shaft (from the steering shaft) with the gear at the center of travel. Use a 0-50 inch lbs. (0-6 Nm) torque wrench to measure preload.

e. Turn the adjuster screw in until the necessary preload torque is 4-10 inch lbs. (0.5-1.2 Nm) more than the first measurement.

f. Hold the adjuster screw from turning and tighten the jam nut to 25 ft. lbs. (34 Nm). Recheck the torque to assure the adjustment did not change while tightening the jam nut.

11. Install the horn cap or cover.

12. Align and install the pitman arm to the shaft, then secure. Refer to the procedure earlier in this section for details.

13. Remove the jackstands and carefully lower the vehicle, then connect the negative battery cable.

REMOVAL & INSTALLATION

See Figure 95

1. Disconnect the negative battery cable.

2. Raise and support the front of the vehicle safely using jackstands under the frame. Turn the wheels so they are facing in the straight ahead position.

3. On late model vehicles (or as equipped), remove the retainers and the shield from the base of the intermediate shaft.

4. Matchmark the intermediate shaft-to-steering gear connection in order to assure proper installation.

5. Remove the intermediate shaft-to-steering gear pinch bolt.

6. Matchmark and remove the pitman arm from the pitman shaft. For details, please refer to the procedure located earlier in this section. On some late model vehicles it may be easier to save this step for later as access to the pitman arm/shaft may be difficult unless the gear is loosened or removed.

➡When separating the pitman arm from the shaft, DO NOT use a hammer or apply heat to the arm.

7. Remove the steering gear-to-frame mounting bolts and washers, then remove the gear from the vehicle.

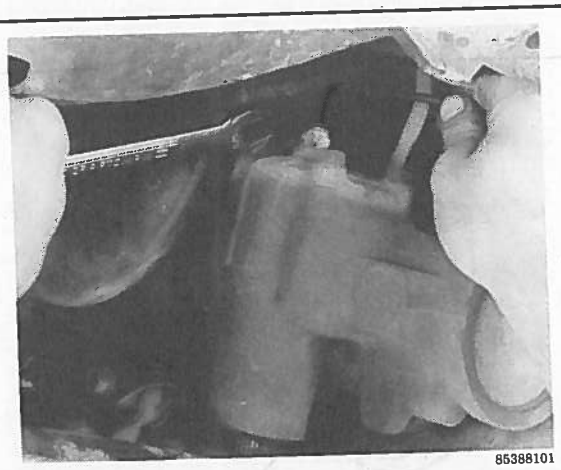


Fig. 94 Adjusting overcenter preload on some gears requires a hex key for the bolt/screw and an open end wrench for the nut

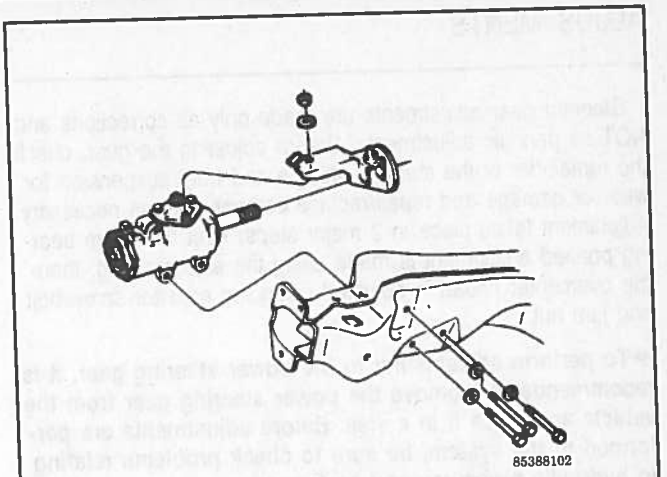


Fig. 95 Common steering gear mounting

8. If note done already on late model vehicles and, if necessary, remove the pitman shaft from the gear at this time.

To install:

9. If necessary on late model vehicles, align and install the pitman shaft to the gear.

10. Position the steering gear to the frame and secure by threading the retaining bolts. On some late model vehicles, if not done already, it will be necessary to align and install the pitman arm to the shaft at this time.

11. Install the gear retaining bolts and tighten to 60 ft. lbs. (81 Nm) for vehicles through 1988 or to 55 ft. lbs. (75 Nm) for 1989-93 vehicles.

➡When installing the steering gear, be sure that the intermediate shaft bottoms on the worm shaft, so that the pinch bolt passes through the undercut on the worm shaft. Check and/or adjust the alignment of the pitman arm-to-pitman shaft.

12. Align and install the intermediate shaft coupling using the pinch bolt. Tighten the bolt to 30 ft. lbs. (41 Nm).

13. If not done already, align and install the pitman arm to the shaft. Refer to the procedure earlier in this section for details.

14. If applicable, install the coupling shield over the intermediate shaft-to-gear coupling.

15. Remove the jackstands and carefully lower the vehicle.

16. Connect the negative battery cable.

Power Steering Gear

The recirculating ball type power steering gear used on these vehicles is basically the same as the manual steering gear, except that it uses a hydraulic assist on the rack piston.

The power steering gear control valve directs the power steering fluid to either side of the rack piston, which rides up and down the worm shaft. The steering rack converts the hydraulic pressure into mechanical force. Should the vehicle loose the hydraulic pressure, it can still be controlled mechanically.

ADJUSTMENTS

Steering gear adjustments are made only as corrections and NOT as periodic adjustments. Before adjusting the gear, check the remainder of the steering linkage and front suspension for wear or damage and repair/replace components, as necessary. Adjustment takes place in 2 major steps. First the worm bearing preload adjustment is made using the adjuster plug, then the overcenter prload is adjusted using the adjuster screw/bolt and jam nut.

➡**To perform adjustments to the power steering gear, it is recommended to remove the power steering gear from the vehicle and place it in a vise. Before adjustments are performed to the system, be sure to check problems relating to hydraulic pressures and performance.**

Worm Bearing Preload

See Figures 96, 97, 98 and 99

1. Remove the steering gear from the vehicle and position it in a vise. For details, please refer to the procedure found earlier in this section.
2. Using a hammer and a brass punch, drive the adjuster plug locknut counterclockwise and remove it from the end of the steering gear.
3. Use an adjustable spanner wrench such as J-7624 or equivalent, to turn the adjuster plug inward, until it firmly bottoms in the housing with a torque of 20 ft. lbs. (27 Nm).
4. Use a scribing tool to place a matchmark (on the housing) next to the one of the spanner wrench holes in the adjuster plug.
5. Using a ruler, measure ½ in. (13mm) counterclockwise from the scribed mark (on the housing) and place another mark.
6. Use the spanner to turn the adjuster plug (counterclockwise) until the hole in the adjuster plug aligns with the 2nd scribed mark.
7. While holding the adjuster plug in alignment, install and tighten the adjuster plug locknut.
8. Perform the overcenter preload adjustment.

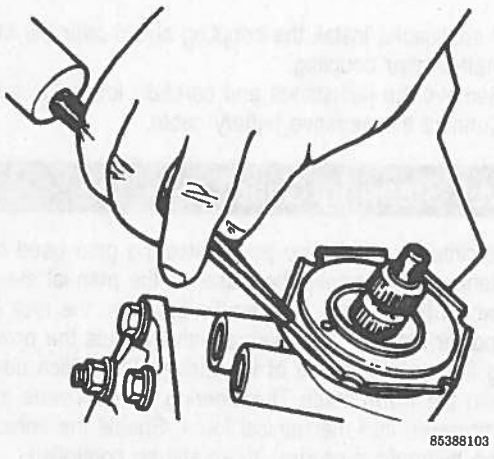


Fig. 96 Remove the adjuster locknut from the gear by driving it counterclockwise

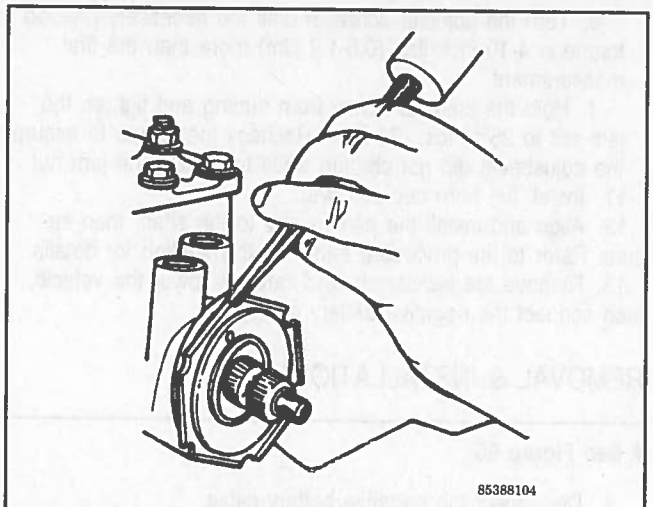


Fig. 97 Matchmark the housing with the adjuster plug hole

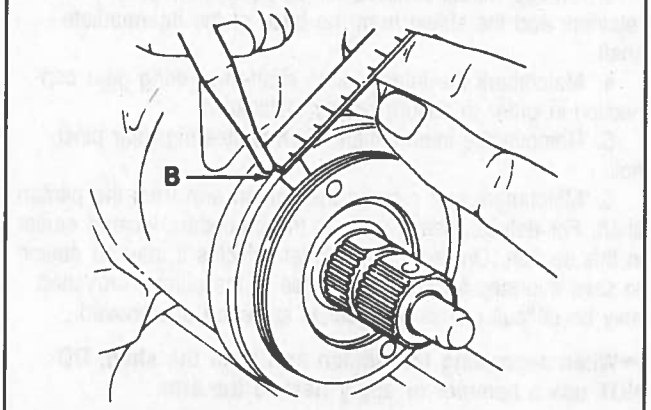


Fig. 98 Measure back (counterclockwise) and scribe a second mark

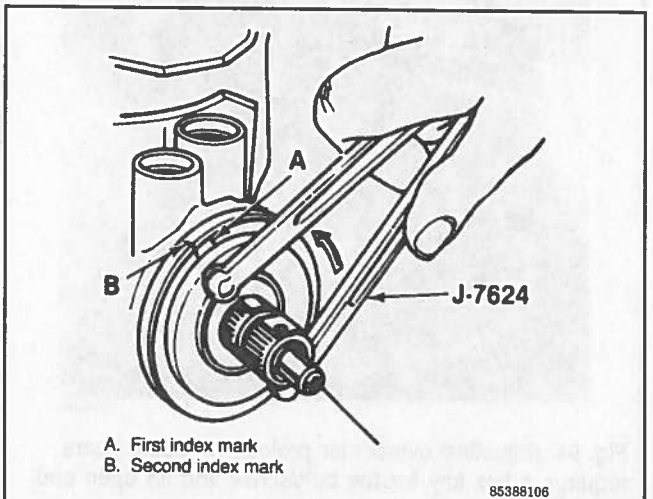


Fig. 99 Use the spanner wrench to align the adjuster plug with the second mark

Overcenter Preload

See Figures 100, 101 and 102

1. Adjust the worm bearing preload. For details, please refer to the procedure earlier in this section.
2. Rotate the stub shaft from stop-to-stop and count the number of turns necessary.
3. Starting from one stop, turn the stub shaft back ½ the number of turns (to the center of the gear).

➡With the stub gear centered, the flat on top of the shaft should face upward and be parallel with the side cover; the master spline on the pitman shaft should be in line with the adjuster screw.

4. Loosen the pitman shaft adjuster screw locknut, then turn the adjuster screw counterclockwise until it is fully extended. Turn the screw clockwise one full turn.
5. Place a 0-50 inch lbs. (0-6 Nm) torque wrench vertically on the stub shaft, then rotate it 45° (to each side) and record the highest drag measured near or on the center.

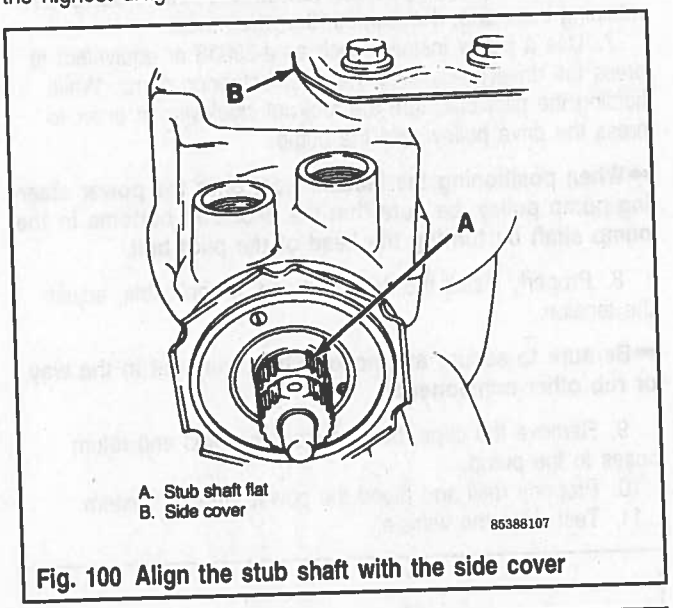


Fig. 100 Align the stub shaft with the side cover

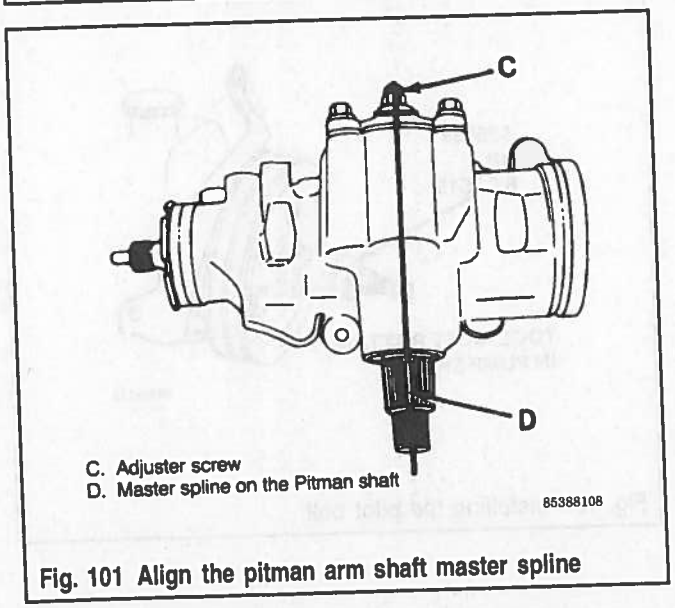


Fig. 101 Align the pitman arm shaft master spline

6. Turn the adjuster screw inward until the torque on the stub shaft is 6-10 inch lbs. (0.6-1.2 Nm) greater than the initial reading.
7. Tighten the adjuster screw jam nut to 20 ft. lbs. (27 Nm) while holding the adjuster screw from turning. Double check for the proper measurement to assure the screw was not turned while tightening the nut.
8. Install the power steering gear into the vehicle.

REMOVAL & INSTALLATION

1. Raise and support the front of the vehicle safely using jackstands.
2. For MFI-Turbo vehicles, drain the charge air cooler system and remove the charge air cooler radiator. For details, please refer to Section 3 of this manual.
3. Position a fluid catch pan under the power steering gear.
4. Disconnect the feed and return fluid hoses from the steering gear. Immediately cap or plug all openings to prevent system contamination or excessive fluid loss.

➡Be sure to plug the pressure hoses and the openings of the power steering pump to keep dirt out of the system.

5. On late model vehicles (or if equipped) remove the intermediate shaft lower coupling shield.
6. Remove the intermediate shaft-to-steering gear bolt. Matchmark the intermediate shaft-to-power steering gear and separate the shaft from the gear.
7. Matchmark and remove the pitman arm from the gear pitman shaft. For details, please refer to the procedure earlier in this section.
8. Remove the power steering gear-to-frame bolts and washers, then carefully remove the steering gear from the vehicle.

To install:

9. Position the steering gear to the vehicle and secure by finger-tightening the fasteners. For some late model vehicles, the pitman arm must be connected to the gear while it is still removed from the vehicle or while it is partially installed and

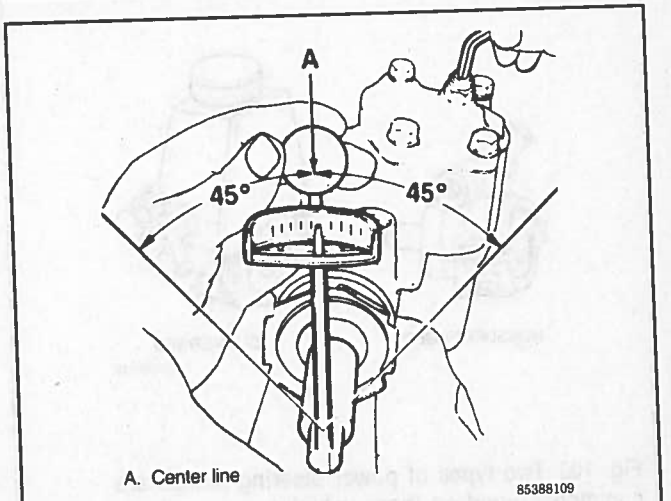


Fig. 102 Use an inch lbs. torque wrench to measure overcenter rotation torque

lowered for access. If necessary, align and install the pitman arm to the shaft at this time.

10. Torque the power steering gear-to-frame bolts to 55 ft. lbs. (75 Nm).

11. Align and install the intermediate shaft to the power steering, then secure using the pinch bolt.

12. If equipped, install the shield over the intermediate shaft lower coupling.

13. Remove the caps, then connect the feed and return hoses to the power steering gear. Refill the pump reservoir.

14. On MFI-Turbo vehicles, install the charge air cooler radiator.

15. Remove the jackstands and carefully lower the vehicle.

16. On MFI-Turbo vehicles, properly refill and bleed the charge air cooler system.

17. Properly bleed the power steering system.

18. Road test the vehicle.

Power Steering Pump

See Figure 103

Two types of power steering pumps are commonly found on these vehicles; the submerged and the non-submerged types. The submerged pump has a housing and internal parts which are inside the reservoir and operate submerged in oil. The non-submerged pump functions the same as the submerged pump except the reservoir is separate from the housing and internal parts.

REMOVAL & INSTALLATION

Except MFI-Turbo

See Figures 104, 105, 106 and 107

1. Position a fluid catch pan under the power steering pump.

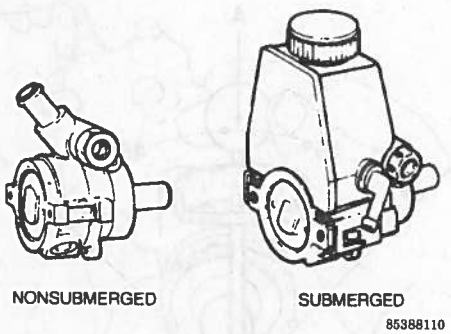


Fig. 103 Two types of power steering pumps are commonly found on these vehicles

2. Disconnect the feed and return hoses from the power steering pump, then drain the excess fluid into the catch pan.

➡On models equipped with a remote fluid reservoir, disconnect and plug the hose(s) in order to prevent system contamination or excessive fluid loss.

3. Remove the drive belt from the pulley.

4. Install a puller tool such as J-25034, or equivalent onto the power steering pump pulley. While holding the pilot bolt, turn the tool nut counterclockwise in order to press the drive pulley from the pump.

➡When installing the puller tool onto the power steering pump pulley, be sure that the pilot bolt bottoms in the pump shaft by turning the head of the pilot bolt.

5. Remove the power steering pump-to-bracket bolts and, if applicable, the rear brace, then remove the pump from the vehicle.

To install:

6. Position the pump to the vehicle and secure using the retaining bolts and, if equipped, the rear brace.

7. Use a pulley installer such as J-25033 or equivalent to press the drive pulley onto the power steering pump. While holding the pilot bolt, turn the tool nut clockwise in order to press the drive pulley onto the pump.

➡When positioning the installer tool onto the power steering pump pulley, be sure that the pilot bolt bottoms in the pump shaft by turning the head of the pilot bolt.

8. Properly install the drive belt and, if applicable, adjust the tension.

➡Be sure to secure any hoses which may get in the way or rub other components.

9. Remove the caps, then connect the feed and return hoses to the pump.

10. Properly refill and bleed the power steering system.

11. Test drive the vehicle.

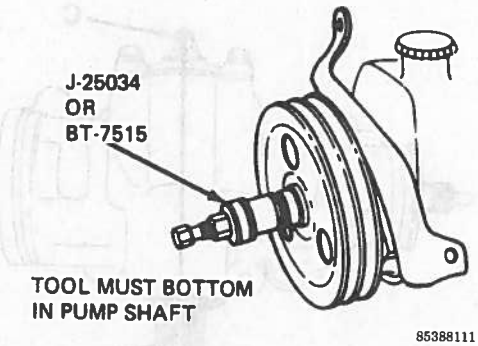


Fig. 104 Installing the pilot bolt

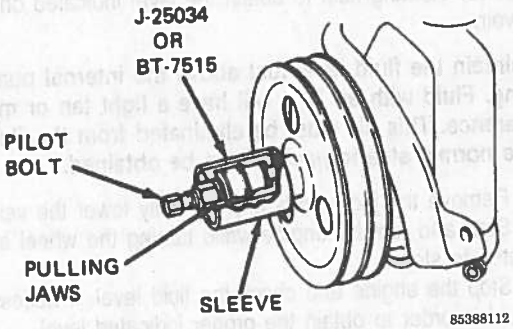


Fig. 105 Installing the puller

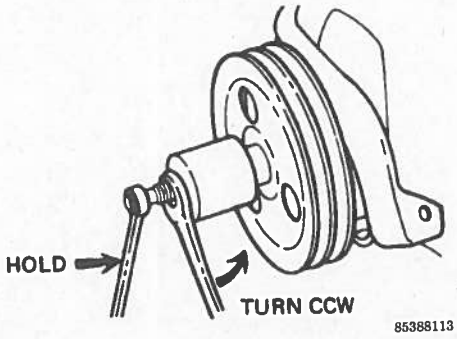


Fig. 106 Removing the power steering pump pulley

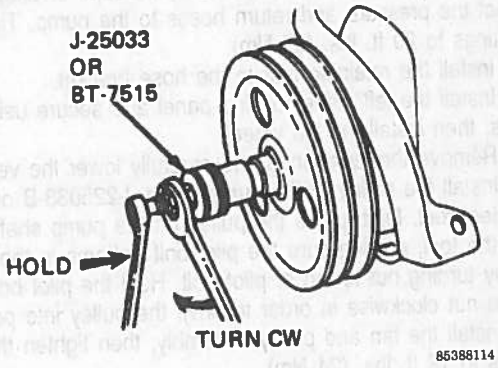


Fig. 107 Installing the power steering pump pulley

MFI-Turbo

1. Disconnect the negative battery cable, then remove the air cleaner and duct.
2. Remove the upper fan shroud screws and shroud.
3. Loosen the fan nuts, then remove the serpentine drive belt.
4. Remove the fan-to-water pump pulley nuts, then remove the fan and pulley assembly.
5. Install J-25034-B to the steering pump pulley. Make sure the pilot bolt bottoms in the pump shaft by turning the nut to top of pilot bolt. Hold the pilot bolt and turn the nut counterclockwise in order to drive the pulley from the shaft.
6. Raise and support the front of the vehicle safely using jackstands.
7. Remove the left wheel, then remove the left wheelhousing panel screws and the panel.
8. Position a drain pan below the pump assembly, then remove the bolt from the hose bracket.
9. Disconnect the return and pressure hoses from the pump. Immediately cap or plug all openings to prevent excessive fluid loss or system contamination.

10. Remove the bolts from the rear bracket, at the alternator.
11. From underhood, remove the pump and rear bracket. If necessary, remove the nuts and separate the pump from the bracket.

To install:

12. If separated, install the rear bracket to the pump and tighten the retaining nuts to 37 ft. lbs. (50 Nm).
13. Install the pump and rear bracket assembly to the vehicle.
14. Install the bolts to the rear bracket, at the alternator, then tighten to 37 ft. lbs. (50 Nm).
15. From under the vehicle, remove the caps or plugs, then connect the pressure and return hoses to the pump. Tighten the fittings to 20 ft. lbs. (27 Nm).
16. Install the retaining bolt to the hose bracket.
17. Install the left wheelhousing panel and secure using the screws, then install the left wheel.
18. Remove the jackstands and carefully lower the vehicle.
19. Install the pulley to the pump using J-225033-B or an equivalent tool. First, place the pulley on the pump shaft, then install the tool, making sure the pilot bolt bottoms in the pump shaft by turning nut to top of pilot bolt. Hold the pilot bolt and turn the nut clockwise in order to drive the pulley into position.
20. Install the fan and pulley assembly, then tighten the pulley nuts to 18 ft. lbs. (24 Nm).
21. Install the serpentine drive belt.
22. Install the upper fan shroud, then tighten the retainers to 89 inch lbs. (10 Nm).
23. Install the air cleaner and duct.
24. Connect the negative battery cable, then properly refill and bleed the power steering system.

SYSTEM BLEEDING

1. Add fluid to the reservoir until the proper level is reached, then allow the fluid to settle for at least 2 minutes. Start the engine and let it run for a few seconds, then turn it off and check if the level has changed. Repeat this until the level remains constant.
2. Raise and support the front of the vehicle safely using jackstands under the frame to the wheels are free to turn.
3. Start and run the engine, then slowly turn the wheels in both directions (lightly hitting the stops) several times.
4. Stop the engine and check the fluid level. If necessary, add power steering fluid to obtain the level indicated on the reservoir.

➡**Maintain the fluid level just above the internal pump casting. Fluid with air in it will have a light tan or milky appearance. This air must be eliminated from the fluid before normal steering action can be obtained.**

5. Remove the jackstands and carefully lower the vehicle.
6. Start and run the engine while turning the wheel slowly from stop to stop.
7. Stop the engine and check the fluid level. If necessary, add fluid in order to obtain the proper indicated level.
8. If the fluid is extremely foamy, allow the vehicle to stand for a few minutes, then repeat the procedure through this step.
9. Road test the vehicle to make sure the steering functions normally and is free from noise.
10. Allow the vehicle to stand for 2-3 hours, then recheck the power steering fluid.

TORQUE SPECIFICATIONS

Component	U.S.	Metric
Ball joints	17 ft. lbs.	23 Nm
Service replacement retainers		
Stud nut		
2WD		
Upper	65 ft. lbs.	90 Nm
1982–86	61 ft. lbs.	83 Nm
1987–93		
Lower stud nut	90 ft. lbs.	120 Nm
1982–88	83 ft. lbs.	113 Nm
1989–93	70 ft. lbs.	95 Nm
4WD (upper/lower) stud nut	20 ft. lbs.	27 Nm
Control arm bumper retainer	60 ft. lbs.	82 Nm
Idler arm		
Frame bolts	35 ft. lbs.	47 Nm
Relay rod nut	60 ft. lbs.	81 Nm
2WD		
4WD		
Leaf spring		
U-bolts (using 2 passes of a diagonal sequence)	18 ft. lbs.	25 Nm
1st pass	85 ft. lbs.	115 Nm
2nd pass		
Front and rear spring mounting fasteners	88 ft. lbs.	120 Nm
1982–88	92 ft. lbs.	125 Nm
1989–93		
Lower control arm		
2WD		
Pivot bolt jam nuts	94 ft. lbs.	127 Nm
Front nut 1982–92	67 ft. lbs.	91 Nm
Rear nut 1982–92 and both nuts 1993		
4WD		
Bolts	148 ft. lbs.	200 Nm
1982–92 if threaded into a fitting		
Nuts (with the suspension at normal trim height)	92 ft. lbs.	125 Nm
1982–92	70 ft. lbs.	95 Nm
1993		
Pitman arm	185 ft. lbs.	250 Nm
Pitman shaft nut	60 ft. lbs.	82 Nm
Relay rod nut		
Shock absorber		
Front		
2WD	100 inch lbs.	11 Nm
Upper nut	20 ft. lbs.	27 Nm
Lower bolts	54 ft. lbs.	73 Nm
4WD (upper/lower)		
Rear		
Upper retainer	15 ft. lbs.	20 Nm
1982–88	17 ft. lbs.	23 Nm
1989–93		
Lower retainer	50 ft. lbs.	70 Nm
1982–88	47 ft. lbs.	64 Nm
1989–93		
Stabilizer bar		
2WD	24 ft. lbs.	33 Nm
Bracket bolts	13 ft. lbs.	17 Nm
Link bolts		

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TORQUE SPECIFICATIONS

Component	U.S.	Metric
Stabilizer bar		
4WD		
Bar clamp-to-control arm bolts	24 ft. lbs.	33 Nm
Frame clamp retaining bolts/nuts	35 ft. lbs.	48 Nm
Steering column		
Column-to-intermediate shaft joint nut/bolt		
1982–92	26 ft. lbs.	35 Nm
1993	45 ft. lbs.	62 Nm
Floor/toe retainers	120 inch lbs.	13 Nm
Column bracket-to-column bolts	17 ft. lbs.	22 Nm
Column bracket-to-instrument panel		
1982–93	22 ft. lbs.	30 Nm
Steering damper		
Frame bracket bolt/nut	26 ft. lbs.	35 Nm
Relay rod bolt/nut tighten	45 ft. lbs.	62 Nm
Steering gear		
Except manual 1982–88	55 ft. lbs.	75 Nm
Manual 1982–88	60 ft. lbs.	81 Nm
Intermediate shaft-to-gear pinch bolt	30 ft. lbs.	41 Nm
Steering linkage installer tools		
J-29193 (12mm) or J29194 (14mm)	40 ft. lbs.	54 Nm
Steering wheel retaining nut	30 ft. lbs.	40 Nm
Tie rod		
Adjustment clamp bolt	14 ft. lbs.	19 Nm
Tie rod end retaining nuts	35 ft. lbs.	47 Nm
Torsion bar		
1983–91		
Nuts (or bolts from below the frame)	26 ft. lbs.	35 Nm
Top center retainer bolt	25 ft. lbs.	35 Nm
1992		
Insulator mounting retainer bolts	26 ft. lbs.	35 Nm
Nuts	25 ft. lbs.	34 Nm
Upper control arm		
2WD		
Pivot shaft/bushing nuts		
1982–86 (with weight on suspension)	65 ft. lbs.	88 Nm
1987	85 ft. lbs.	115 Nm
Control arm-to-frame bolts		
1982–86	45 ft. lbs.	60 Nm
1987	65 ft. lbs.	88 Nm
4WD (cam end nuts)		
Wheel lug nuts		
1982–91		
Except MFI-Turbo		
Steel wheels	73 ft. lbs.	100 Nm
Aluminum alloy wheels	90 ft. lbs.	120 Nm
MFI-Turbo wheels	100 ft. lbs.	140 Nm
1992 wheels	90 ft. lbs.	120 Nm
1993 wheels	95 ft. lbs.	130 Nm

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